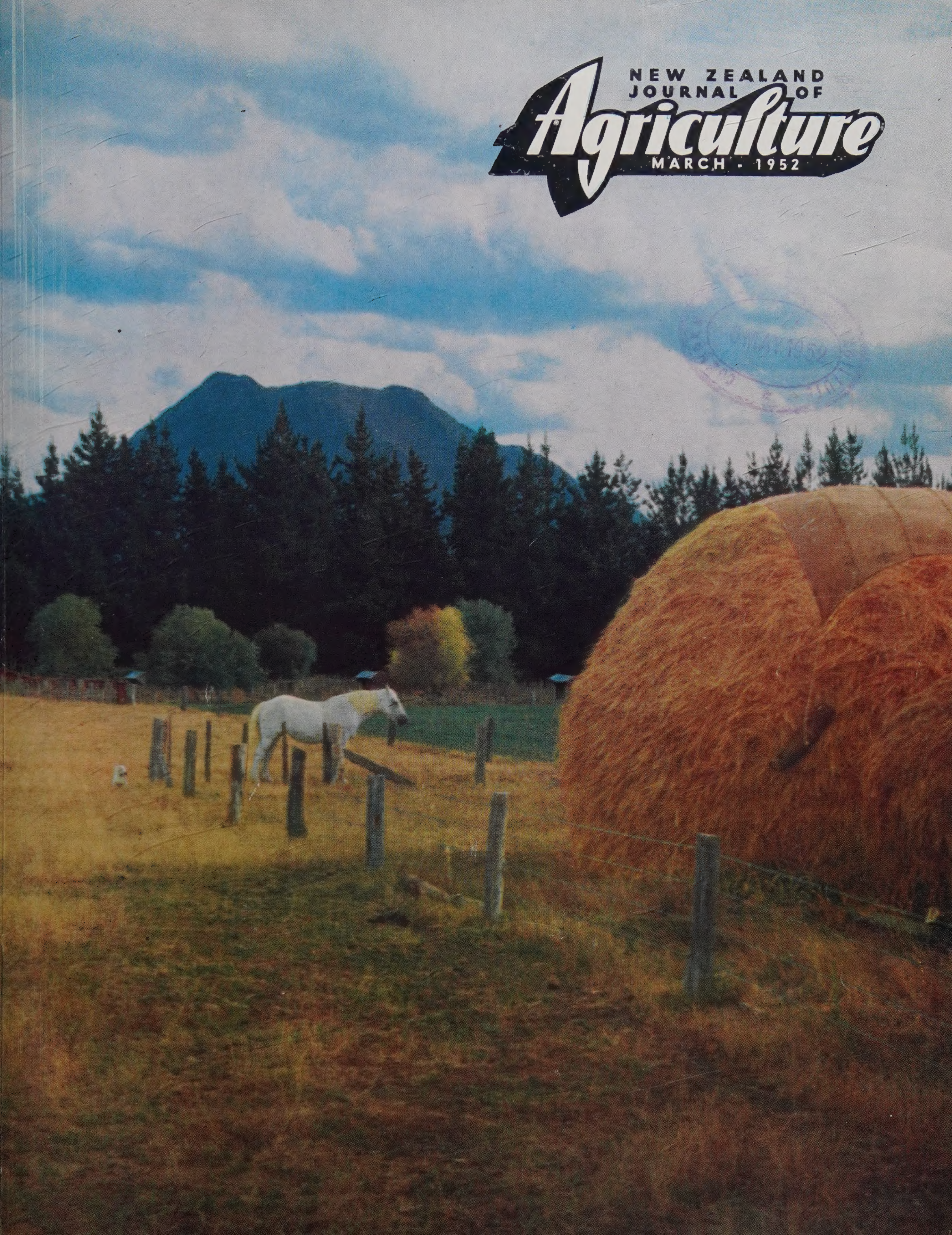
NEW ZEALAND JOURNAL OF Agriculture

MARCH - 1952



More Time for Profit and Pleasure

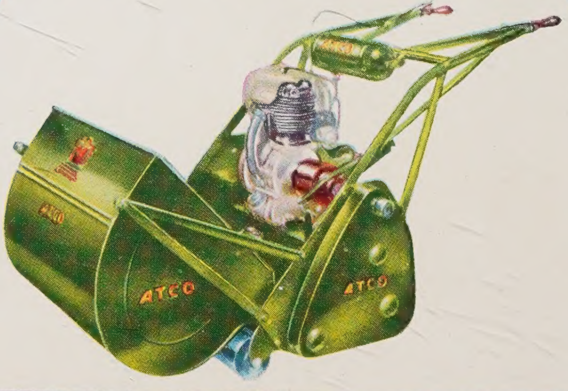
By Appointment

ATCO *Motor Mowers*

BRITAIN'S FOREMOST MOTOR MOWER

Easy to use — Economical—Moderately Priced. The full ATCO range of power motors is now available in New Zealand

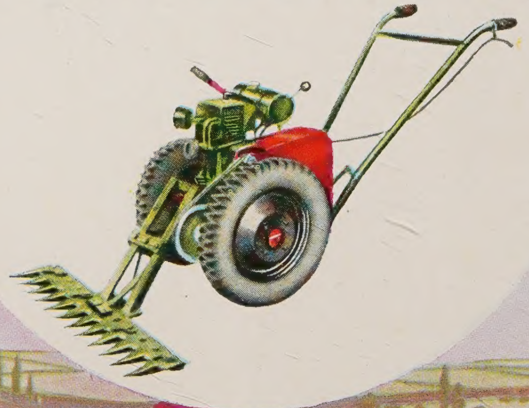
14 in., 17 in., 20 in., 28 in. and 34 in. widths.



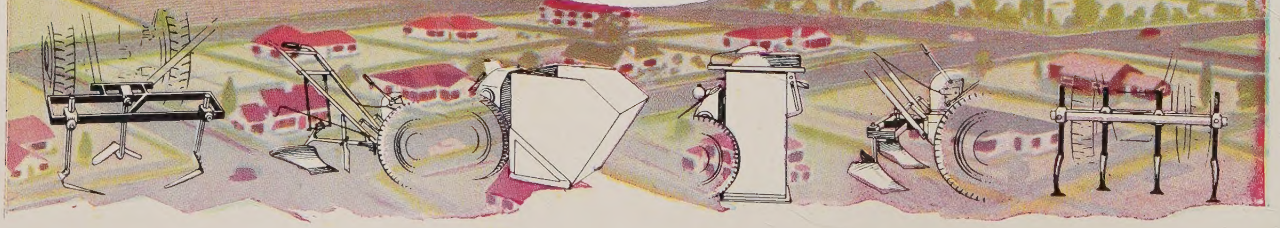
Kick starter—adjustable cutting height — two simple fingertip controls —totally enclosed drive mechanism — smooth clutch action — grass catcher designed to prevent grass tumbling forward when partially full —ratchet controlled rollers for easy turning.

The MAYFIELD *Motor Scythe*

The Mayfield is ideal for all rough mowing requirements and will cut blackberry, fern, long grass, rubbish, etc. Particularly suitable for close cutting around trees, buildings, and along fences, hedges and roadsides.



4 stroke engine - 3 speed gear box - lever starting - cutter unit quickly detachable, leaving a light versatile garden tractor. Quick-fix attachments - cultivators-hoes-plough - furrower - hedge trimmer - dump barrow - saw bench - offset mower also available.



Write for the name of your nearest dealer.

NEW ZEALAND DISTRIBUTORS:

P.O. BOX 1321 IBL **Ivory Bros. Ltd.** WELLINGTON

BRANCHES AND AGENTS THROUGHOUT NEW ZEALAND.

Volume 84
Number 3
15 March
1952.
(Established 1910)

NEW ZEALAND
JOURNAL OF
Agriculture

Published by
Direction
of
Hon. K. J. Holyoake,
Minister of Agriculture

This Month's Cover

Farmlands at Onepu on the Rangitaiki Plains, Bay of Plenty, are the subject of this month's cover, which has been reproduced from a colour photograph by Atkinson and Finney. In the background is Mt. Edgecumbe, one of the dominating features of the plains, which was named by Captain Cook during his first visit to New Zealand. In its natural state much of the Rangitaiki Plains area was swamp. Since the land was developed through an extensive drainage system the rich alluvial flats have been used mainly for dairy farming and in Whakatane County there are more than 50,000 cows in milk.

New Zealand Department of Agriculture

HEAD OFFICE:
Dominion Farmers' Institute Building,
Featherston Street, Wellington.

DIRECTOR-GENERAL:
E. J. Fawcett

ASSISTANT DIRECTOR-GENERAL:
R. B. Tennent

DIVISIONAL DIRECTORS:

Animal Research	J. F. Filmer
Dairy	H. A. Foy
Extension	P. W. Smallfield
Horticulture	A. M. W. Greig
Livestock	J. E. McIlwaine

Editor: G. J. Neale

TABLE OF CONTENTS

Testing of Dairy Cattle for Tuberculosis	..	163
Ground Water in New Zealand	D. L. Johns	164
Show Dates	..	167
The Cherimoya: A Delicious Dessert Fruit	P. Everett	168
Production of Table Poultry	F. C. Bobby	169
Handling Browntop Country in South Canterbury	C. P. Whatman	171
Meteorological Records for January	..	174
Scope for More than Million Pigs in New Zealand	A. Longwill	175
Trials with Nauru Rock Phosphate as Pasture Topdressing	K. Cottier	183
Care of Livestock during April	..	190
Dairy Produce Graded for Export	..	190
Preparations for Cereal Crops: Drainage by Pumping (Seasonal Notes)	..	191
Control of Weeds in Grass Seed Crops by Hormone Sprays	R. P. Hill	192
Harvesting Maturity of Stone Fruit	T. Conway	193
Radio Broadcasts	..	196
Pasture Establishment on Flooded Areas of Gisborne Flats	J. G. McKee and G. J. Graham	197
Trials of Flue-cured Tobacco Varieties	R. Thomson	199
Importance of Lime in Southland Farming	W. Faithful	203
Establishing and Maintaining a Rose Garden	C. K. Ellis	209
Recent Research Work: Potassic Fertilisers for Topdressing	..	216
Broad Beans	A. G. Kennelly	217
Using Firearms Safely and Skilfully	G. G. Kelly	219
Trends in New Zealand's Lemon-growing Industry	W. A. Fletcher	220
Drilling Seed into Tussock Grassland	L. W. Blackmore	221
Beekeeping in Tauranga County	R. Goddard	223
Dairying on Canterbury Light Land with Aid of Irrigation	G. K. McPherson	225
The Home Garden	C. L. Napier	230
Domestic Beekeeping	S. Line	236
Building and Fitting out a Laying House for Household Poultry	..	237
Nature and Control of Ripe Spot of Apples	C. E. Woodhead and H. Jacks	239
Passion Fruit and Persimmons	Nell Macpherson	241
Two-piece Suit for Baby Girl	..	245
Making the Best Use of the Household Water Supply	Evelyn E. Moore	247
White Sauces	Nell Macpherson	251
The Flower Garden	C. K. Ellis	252
Wool Has many Uses in the Home	..	256

SUBSCRIPTION RATES

The "Journal" is issued monthly. The subscription within New Zealand is 10s. a year; the overseas subscription is 13s. The "Journal" may be ordered from any bookseller or newsagent, or direct from any office of the Department of Agriculture. Individual copies are available from Publications Section, P.O. Box 2298, Wellington, at 1s. a copy, post free.

Subscription inquiries (preferably accompanied by the address cut from a recent "Journal" envelope or wrapper) should be sent to the nearest office of the Department of Agriculture.

COPYRIGHT PROVISIONS

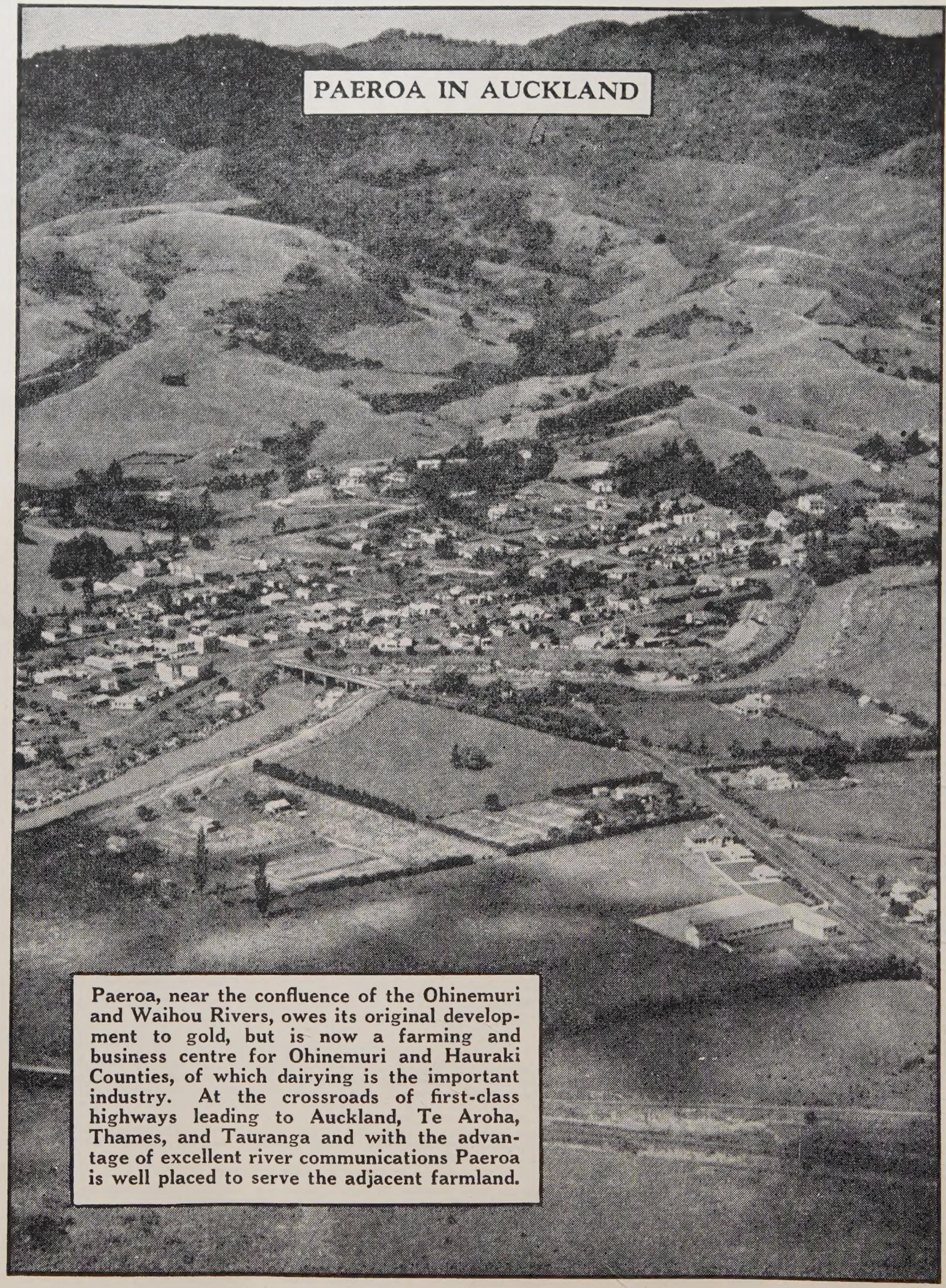
Articles in "The Journal of Agriculture" are copyright, but may be reprinted, **provided both the "Journal" and author are acknowledged.**

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

All correspondence relating to the "Journal" should be addressed to the Editor, "The New Zealand Journal of Agriculture", P.O. Box 2298, Wellington.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

PAEROA IN AUCKLAND



Paeroa, near the confluence of the Ohinemuri and Waihou Rivers, owes its original development to gold, but is now a farming and business centre for Ohinemuri and Hauraki Counties, of which dairying is the important industry. At the crossroads of first-class highways leading to Auckland, Te Aroha, Thames, and Tauranga and with the advantage of excellent river communications Paeroa is well placed to serve the adjacent farmland.

[V. C. Browne photo.

Testing of Dairy Cattle for Tuberculosis

THE compulsory testing for tuberculosis of dairy herds on town milk supply farms has now been in operation about a year. Up to the end of January this year 57,952 dairy cattle have been tested and 3826 reactors found, a percentage of 6.6 of affected cattle.

Many of the reactors did not show extensive disease lesions, but as eradication is the ultimate objective of the scheme, all reactors, irrespective of the extent of the disease, have been removed from herds and destroyed and their owners compensated.

In some areas of dense cow population the percentage of reactors is high and has in fact exceeded our original expectations. In spite of this and the consequent higher cost of compensation, the Government's plan to complete the testing within the planned 3 years will be carried out.

Priority to Herds Supplying Raw Milk

In the testing programme priority has so far been given to the testing of herds supplying raw milk. There has been considerable expansion in milk treatment stations and about 85 per cent. of all town milk sold in urban areas is pasteurised.

It has been known for some years that incidence of tuberculosis disease in cattle varies considerably from district to district and from farm to farm. In the South Island testing the average of reactors has so far been 2 per cent., but in the North Island the average is between 9 and 10 per cent.

Details of Testing

Details of the tuberculosis testing of dairy herds supplying raw milk to the principal centres of population are as follows:—

	Cattle tested	*Reactors*	*Per cent.*
Auckland	6918	614	8.9
Balclutha	1074	10	0.9
Blenheim	965	10	1.0
Christchurch	4929	179	3.6
Dunedin	8266	524	6.3
Gisborne	1328	70	5.3
Hamilton	1184	208	17.6
Invercargill	2726	26	1.0
Masterton	1994	37	1.9
Nelson	1282	2	0.2
Oamaru	1169	25	2.1
Palmerston North	3688	393	10.6
Pukekohe	667	79	11.8
Rotorua	595	61	10.2
Stratford	1620	102	6.3
Thames	604	92	15.2
Timaru	2701	65	2.4
Waimate	508	5	1.0
Wairoa	804	21	2.6
Wanganui	1129	114	10.1
Wellington	5881	450	7.7
Whangarei	549	9	1.6

Departmental experience shows that the disease is more common in low-lying, flat country and is aggravated if the area is subject to periodic flooding. On drier, better drained country a lower incidence of reactors can be expected.

Once the difficulties which hampered early negotiations with town supply authorities were satisfactorily overcome the testing scheme has operated steadily with the resources available, and progress to date can be considered good. Though the ultimate aim of complete testing of all town supply herds and destruction of all reactors has never been allowed to be clouded by other issues, at the same time adequate supplies of milk to urban areas have had to be ensured and application of the scheme in particular areas has been adjusted accordingly.

Overseas Experience

Great importance is attached to testing for tuberculosis in dairy cattle in some overseas countries. In Denmark, where because of war and post-war feed shortages herds had to be drastically reduced, reactors to the tuberculosis test formed the bulk of the animals culled for slaughter and, making a virtue of necessity, the Danes were able to establish tuberculosis-free herds on a national basis. In Canada an effective compulsory testing scheme operates and in U.S.A., where testing has been compulsory for 35 years, incidence of reactors has been reduced to less than ½ per cent.

Apart from a natural desire to have disease-free herds the rule in New Zealand, we might some day have to face a trade disadvantage with our dairy products on a buyers' market if our incidence of disease in dairy cattle could not stand comparison with that in the herds of our competitors.

Testing of Factory Supply Herds

A scheme for the introduction of tuberculosis testing for factory supply herds was recently presented to me by the Veterinary Services Council, which had had the prior approval of the New Zealand Dairy Board to its suggestions. A quick examination of the scheme, which is intended to be voluntary at first and then merges into compulsion, reveals advantages, some of which are closely related to the maintenance of disease-free town supply herds, which draw their replacements largely from factory supply herds.

I am interested in the proposal as a forward step to the benefit of the dairy industry and the community generally, and have asked that it be examined by departmental officers to see what its introduction would involve in finances and manpower.

K. J. HOLYOAKE, Minister of Agriculture.

Ground Water in New Zealand

By D. L. JOHNS, Assistant Instructor in Agriculture, Department of Agriculture, Christchurch

AS a whole, New Zealand is, by virtue of its climate and topography, well supplied with lakes, rivers, streams, and springs. Hence in most parts of the country an adequate water supply is not a major problem. There are, however, many areas where farmers have to rely on the direct collection of rain-water from roofs or have to bring surface water long distances by pipeline or water-race. The former method depends on the vagaries of the weather and the latter is expensive to install and maintain. In those parts of New Zealand where an adequate water supply from other sources is a problem the use of ground water may solve the problem or provide an alternative means. This article discusses ground water and some of the factors involved in its occurrence and movements.

GROUND water has very material advantages for farmers as well as for townspeople; some of the principal advantages are:—

1. Ground water is generally far more dependable in long periods of drought than surface water.

2. Ground water is relatively pure and free from suspended matter and does not require chemical treatment or filtration.

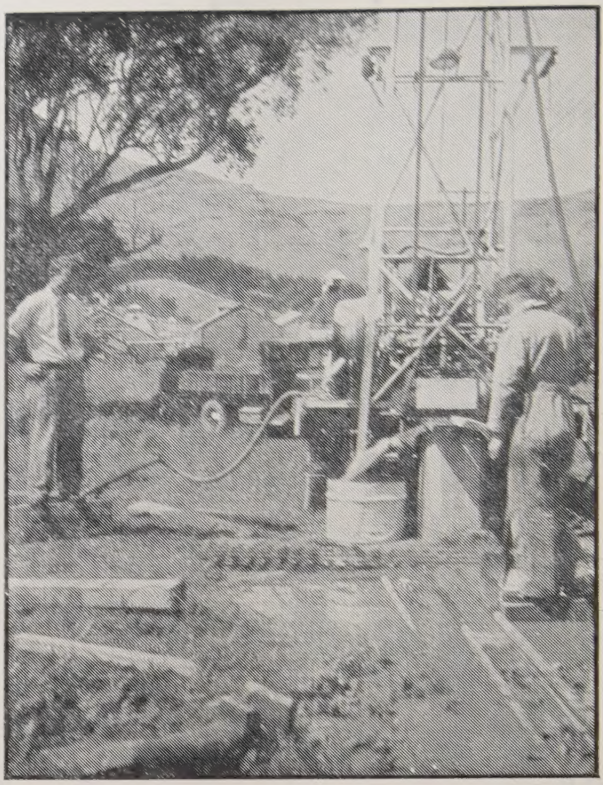
3. Ground water maintains an even temperature throughout the year, having a lower temperature than surface water in summer and a higher one in winter. This is an advantage of some importance to the dairy farmer and the housewife.

4. Provided wells are properly situated and protected the danger of pollution or contamination is much less than with surface water. These factors as well as the fact that wells can often be situated at the point where the water is most needed without an expensive programme of pipe-laying give ground-water supply many advantages over other sources of water supply.

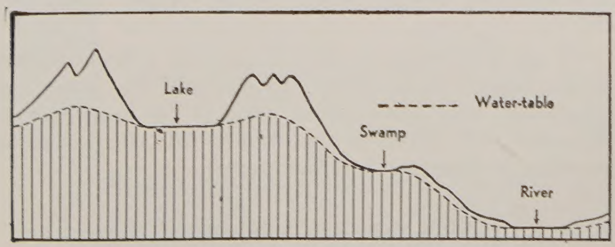
Occurrence and Movement

Writings from ancient times show that the origin and movement of ground water puzzled learned men of their day. Many of the beliefs and superstitions which arose then still find support among some people today. Despite the great increase in recent times in the geologist's knowledge of the earth's structure many people still rely on the "water diviner" to find the correct location for wells. Although scientists have been unable to refute the "magical influences" in the diviner's work, practical tests, carried out all over the world on the diviner's ability, have in no way been favourable to the diviner. Summarising results of tests carried out on 75 New Zealand diviners, P. A. Ongley ("New Zealand Journal of Science and Technology", volume 30 B No. 1, page 54) says: "Of the 75 diviners tested, representative of all occupations and from all parts of New Zealand, not one showed the slightest accuracy in any branch of divination. That 90 per cent. of the diviners are sincere does not lessen the harm they do."

It is now well known that a zone of rock saturated with water exists below the earth's surface at a depth which varies greatly in different places and at different times. This body of water is termed "ground water" and its upper limit the "water-table". The water-table in a very general way follows the configuration of the land surface, being close to the surface near the sea, lakes, rivers, and swamps, and further from the surface under high ground and hills (see the diagram below). Other factors which influence the depth of the water-table are the nature of the rock material in any area, seasonal fluctuations due to rainfall, flooding, over-pumping of wells, and artificial drainage.



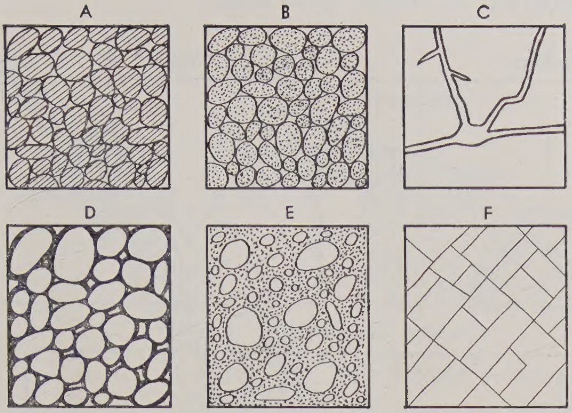
Drilling for water at Heathcote Valley with a rotary-type drilling rig. The well is being tested for yield of water. Geological knowledge is needed to select the best sites for drilling wells for underground water.



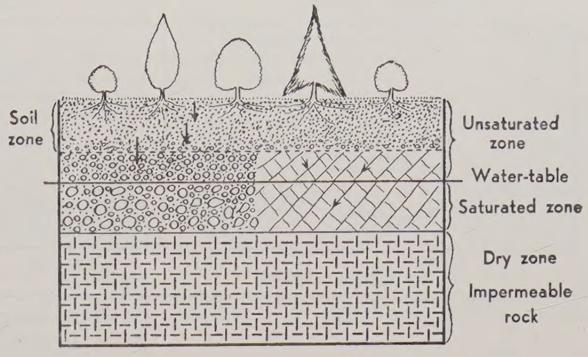
Supply Affected by Nature of Rock

Of these the nature of the rock material in any area is of foremost importance in ground-water supply, as in conjunction with an adequate rainfall it controls the availability of ground water. The outer crust of the earth is composed of a very heterogenous mixture of rock materials which differ widely in their permeability, or ability to allow the passage of water between their constituent particles. Rocks near the surface of the earth contain pore spaces or interstices and the percentage of pore space to the total volume of rock is known as porosity. The main factors which control porosity are the size and shape of the individual grains, the amount of grading and sorting of the grains, and the amount and distribution of cementing material (see the upper left diagram on the opposite page). A moderately coarse-grained rock composed of rounded grains, well sorted and without much cementing material, carries most water. Thus, for instance, sand and gravel are highly porous. This type of porosity is known as granular porosity. There is also fracture or fissure porosity, in which the rocks themselves are impermeable to water due to compactness or abundance of cementing material, but during and since their formation stresses and strains in the earth's crust have caused fractures or fissures to form in the rocks and water is able to percolate through these cracks. For example, in a cracked concrete yard the mass of the concrete itself is impermeable, but water can percolate through the cracks. Many rocks in New Zealand such as the greywacke rock of the main mountain ranges and some of the volcanic rocks and limestones have this type of porosity.

It is, however, the permeability of a rock formation that is most important in the supply of water. Permeability is a measure of the rate at which water can flow through the rock and is determined by the size and degree of connection between pore spaces and other interstices. A



Types of porosity. A—Well-sorted alluvial material (high porosity). B—Well-sorted porous pebbles (very high porosity). C—Rock rendered porous by solution. D—Well-sorted material, but porosity reduced by cementation. E—Poorly sorted alluvial material (low porosity). F—Impervious rock rendered porous by fracture.



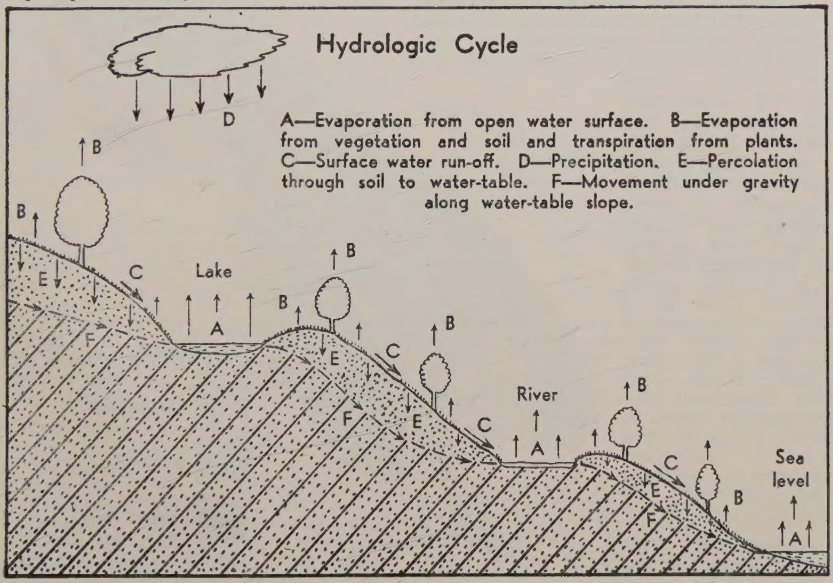
Ground water zones.

rock may be highly porous and yet relatively impermeable, if the pores are very small, for example, as in a clay or silt. These types of deposit may have a porosity of 50 per cent., that is half their total volume is pore space, but they are so impermeable that even when saturated with water they will not yield it to wells. They are, therefore, very poor water-bearing beds. A sandstone or gravel, on the other hand, may have a porosity of only 30 to 40 per cent., but because of the larger size of its pores, its permeability will be much greater and it may be a valuable aquifer (conveyer of water).

Below a certain depth the pressure or weight of the overlying rock materials closes up fractures in underlying rock, and with granular porous rocks the weaker mineral grains are crushed to fill up what would be pore space near the earth's surface. It is for this reason that water is confined to a certain zone of the earth's crust (see the upper right diagram above). In very deep mines, for instance, water may have to be pumped out of the upper shafts while conditions may be very dry and dusty in the lower levels.

The natural force responsible for the occurrence of ground water is what is known as the hydrologic cycle (see the diagram below). Water is evaporated from the surface of the sea and carried inland by winds, where it is precipitated as rain, hail, and snow. Some of the precipitation is evaporated immediately from the surface of the soil and vegetation, some may run off the surface into streams and rivers, some is used by the growing vegetation, and some percolates into the soil and subsoil. Once the soil zone (the greatest depth reached by the roots of growing plants) reaches a certain moisture content (known as its field capacity) any surplus water percolates downward to the zone of saturation or ground water.

Ground water, like rivers and streams, is part of the natural system of drainage and moves under the influence of gravity to lower levels and toward the sea. Because of the resistance by rocks to the passage of ground water, its rate of movement is very much slower than that of surface water. In well-sorted gravel or coarse sand ground water may move as much as several hundred feet per day down the slope of the water-table, but in poorly sorted silt or fine sand and gravel with low permeability the movement may be as little as a fraction of an inch per day.


Hydrologic Cycle
A—Evaporation from open water surface. B—Evaporation from vegetation and soil and transpiration from plants. C—Surface water run-off. D—Precipitation. E—Percolation through soil to water-table. F—Movement under gravity along water-table slope.
D
B
B
E
C
Lake
A
B
B
F
E
C
B
E
F
C
River
A
B
C
E
F
B
Sea level
A

Springs

In its movement to lower levels ground water often emerges at the surface again as springs or seepages. Springs are of five main types (see diagrams on page 166): Depression, contact, tubular, fracture, and artesian springs.

Depression springs, as the name implies, occur in hollows where the water-table intersects the ground surface. For example, springs are often found at the junctions of valley bottoms and the surrounding hills. The flow is generally in the form of a seepage which extends over a considerable area or in a line.

Contact springs occur where impermeable rocks underlie permeable ones. The ground water percolates down through the permeable rock until it reaches the impermeable rock and, as it cannot move further downward, it emerges at the ground surface where the upper edge of the impermeable rock crops out.

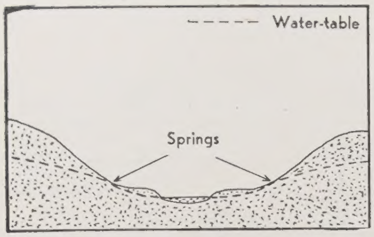
Tubular springs occur in rocks such as limestone in which the percolating water has dissolved some of the rock material, forming tubular channels, which in some places are very large.

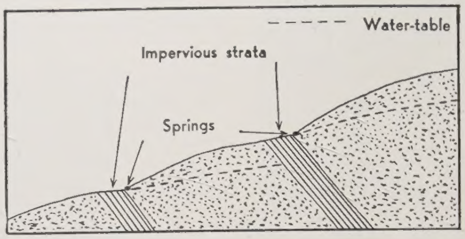
Fracture springs emerge through cracks in otherwise impermeable rock material. Springs of this type are often distributed along straight lines for some distance, their position being determined by lines of jointing or fracture.

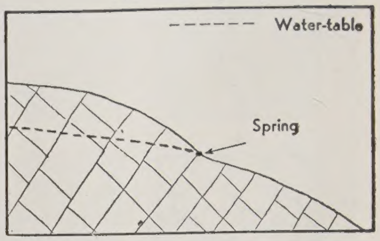
Artesian springs occur only under rather special conditions. The permeable rock containing the ground water must be confined between two layers of impermeable rock. The ground water must also be under hydrostatic pressure; that is, the water level in the permeable rock must be higher than the point of exit of the spring. If the spring flow is confined in a pipe, the water may rise to a considerable height above the spring mouth.

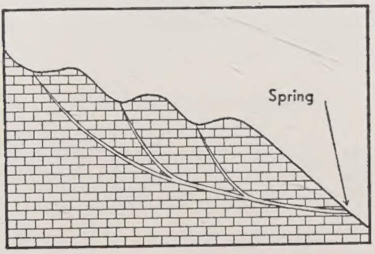
No Survey of Water Resources

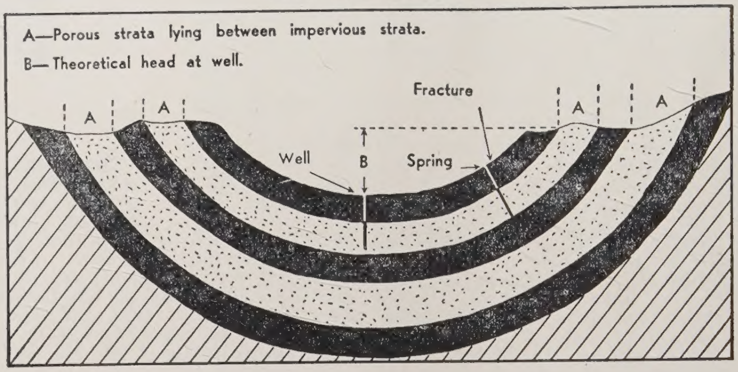
Unfortunately no detailed or systematic survey of water-bearing formations has been carried out yet over large areas of New Zealand. However, with a knowledge of the geological structure and after a study of existing wells


Depression Springs


Contact Springs


Fracture Spring


Tubular Spring


Artesian Conditions
A—Porous strata lying between impervious strata.
B—Theoretical head at well.
Fracture
A
A
A
A
Well
B
Spring

in any area a geologist is able to forecast, with considerably more reliability than a "diviner", the availability of ground water.

The advice of officers of the New Zealand Geological Survey (a branch of the Department of Scientific and Industrial Research) is available free to farmers to help them solve their water-supply problems.

Water-bearing Rocks

The water-bearing rocks of New Zealand can be classified most simply according to their age and origin. Broadly the four main groups of rocks are:—

Group 1: Relatively recent deposits of gravels, sands, and silts of various origins and means of deposition, which are widespread throughout New Zealand. They occur in valley floors, structural depressions, broad plains, and sand dunes. As a source of ground water this group is on the whole the most productive, although the quality of the water varies from place to place. Added importance is gained from the fact that a large proportion of the intensive farming in New Zealand is carried on in these areas.

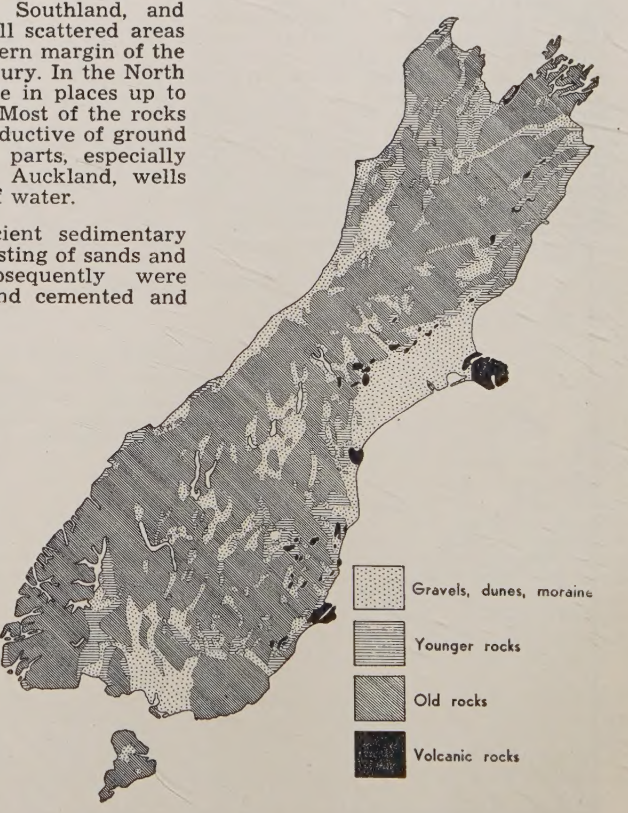
In the North Island the main areas of these deposits are along the western side of the Auckland peninsula, at the base of the Auckland peninsula in the Mercer and Hamilton basins and in the Hauraki area, the Heretaunga Plains in Hawkes Bay, a coastal strip along the South Taranaki Bight which extends some distance inland in the vicinity of Palmerston North, and the two parallel depressions of the Hutt and Wairarapa valleys. In the South Island the main areas are the Canterbury Plains, the Southland Plains, the structural depressions in which Nelson and Blenheim are situated, and the young deposits of the gravel terraces and moraines of Westland. In all these areas abundant water supplies are obtained from numerous wells of various types and depths.

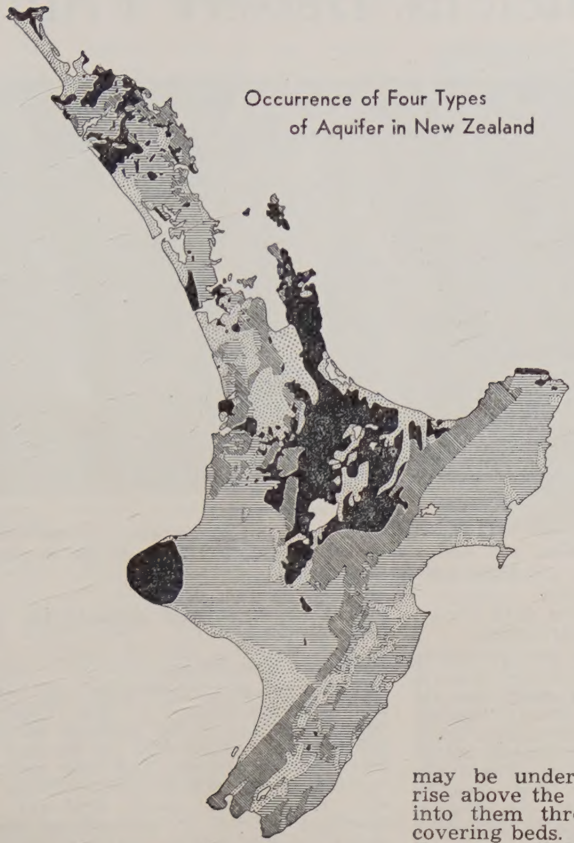
Group 2: Sedimentary rocks younger than those of Group 1. These rocks, consisting mainly of limestones, sandstones, and mudstones (papa), occur extensively in North Auckland, Taranaki, north-west Wellington and along the east coast from Wellington to East Cape. In the South Island they are confined to small areas in Nelson, Marlborough, Otago, Southland, and Westland and to small scattered areas mainly along the eastern margin of the mountains in Canterbury. In the North Island these rocks are in places up to several miles thick. Most of the rocks of this type are unproductive of ground water, but in some parts, especially Taranaki and North Auckland, wells yield good supplies of water.

Group 3: The ancient sedimentary rocks originally consisting of sands and gravels which subsequently were greatly compacted and cemented and in some cases altered chemically by pressures and heat in the earth's crust. This type of formation, known generally as greywacke, is distributed very widely in the South Island, and in the North Island runs in a strip of varying width from Wellington to East Cape. These rocks are relatively impermeable and in most areas do not yield sufficient water to warrant the sinking of wells.

Group 4: Volcanic rocks. There are four types of volcanic rock yielding ground water:—

1. Andesitic rocks found in and around Coromandel Peninsula, in small areas in North Auckland, and in Banks and Otago Peninsulas. The ground water is found in fissures, shatter belts, and joints in the lava and in the fragmental rocks which





Occurrence of Four Types of Aquifer in New Zealand

have been cemented and consolidated. In the Coromandel area huge quantities of ground water have to be pumped out of mine workings, but as there is a good supply of surface water in the area, practically no use has been made of the ground water for farm, factory, or domestic use. Water from this type of rock is obtained from wells in the Dunedin area.

2. Rhyolitic rocks cover a very extensive area of the northern central part of the North Island. In this area the rocks are mostly very porous and well jointed, so that above the main drainage level surface water disappears underground rapidly to reappear as springs, which are numerous and help maintain a regular flow in the streams and rivers. Although the area is sparsely populated, the ground water is used.

3. Basalt lava flows that are fissured and cavernous, and scoria cones that are highly porous cover some 500 square miles of the Auckland peninsula. Percolating water finds its way readily through these rocks to emerge as substantial springs. Water of this origin is identical in composition with surface water and is used by some local authorities and by farmers.

4. Two areas of successive flows of andesitic lavas and showers of tuffs and breccias. One covers about 450 square miles about Mt. Ruapehu and the other about 800 square miles about Mt. Egmont. Many springs occur in the higher parts of the valleys of the radiating streams. In the lower country there is much water at the contact of the lava and the underlying beds.

Besides these major areas there are many alluvial deposits in smaller valleys throughout the country which yield water.

Artesian Water

The conditions necessary for artesian wells occur in several widely scattered areas in New Zealand. Although the typical basin structure as shown in the diagram on the opposite page, is not present as far as is known in New Zealand, similar conditions are produced by the arrangement of alternating permeable and impermeable beds sloping in one direction only. Where the outlets to the water-bearing beds are partially blocked by a decrease in permeability or by overlying mud on the sea floor the water may be under sufficient pressure to rise above the surface in wells drilled into them through the impermeable covering beds. Such artesian slopes, as they are called, are present in several parts of New Zealand, but the most important area is in and about Christchurch, where water from the deeper wells may rise to about 30ft. above the ground. This area is about 50 miles long and up to 10 miles wide and roughly concentric on the centre of Banks Peninsula. Thousands of wells provide water for domestic, municipal, and factory supplies. Other important artesian areas occur on the plains between Palmerston North and Paraparaumu, the Heretaunga Plains, a small area in the Hutt Valley, and the northern end of the Hamilton depression and the northern half of the adjoining Hauraki depression.

Wells

If a farmer has decided to sink a well, probably the most important factor is the type of well to be used. Of the various types in use each possesses advantages, under certain conditions encountered in sinking the well, and at the same time some disadvantages which may preclude its use under a different set of conditions.

The main points to be considered in selecting the type of well are the nature of the rock material to be encountered, the depth to which the well must be sunk, the relative costs, the quantity of water required, and safety from pollution of the supply to be obtained.

These conditions will vary from farm to farm and no hard-and-fast rules can be laid down. To avoid pollution of the supply the farmer should make every effort to have the well some distance from any source of contamination such as stock yards and sewerage systems. Where possible the well should be higher up the water-table slope than these sources of contamination. Similarly the top of the well should be protected from any inflow of surface water. If a farmer has any doubts on these points, he would be well advised to consult an officer of the Geological Survey of the Department of Scientific and Industrial Research or a local well sinker.

Types of Wells

Of the various types of wells, the most commonly used in New Zealand are open or dug wells, drilled wells, and driven wells.

Dug wells are suitable where water can be obtained at reasonably shallow depths and where the rock material is fairly soft. The storage capacity of a dug well is an advantage in relatively impermeable materials, as a larger quantity of water can be pumped from the well in a short time than from a narrow-diameter, drilled or driven well. The latter would produce much the same quantity over a longer pumping period. Where the deposits are more permeable sufficient water can be obtained usually from a drilled or driven well. The open or dug well is a type with which special care must be taken to protect it from pollution, because contaminated water from the surface may easily seep into the well through the permeable sides.

Drilled wells are suitable in the harder rocks and where the water is located at considerable depths. Drilled wells in alluvial deposits generally have to be cased with iron pipe to prevent collapse. Driven wells are suitable in soft or fine materials where the water occurs at shallow to moderate depths.

With modern advances in well-sinking equipment and techniques it appears likely that ground water may yet be utilised successfully in localities where it was not previously thought possible.

Acknowledgments

Most of the information and the map in the section on occurrence of ground water in New Zealand have been adapted from an article, "Underground Water in New Zealand", by J. Henderson, in the "New Zealand Journal of Science and Technology", volume 23 B, pages 97-112 (1942).

The diagram on page 165 showing different types of porosity in rocks is based on one first published by the United States Department of the Interior in "Geological Survey Water-supply Paper 489", by O. E. Meinzer (1923).

The assistance given by B. W. Collins of the Christchurch office of the New Zealand Geological Survey is acknowledged.

Show Dates

THE following are dates and venues of A. and P. shows.

5 April—Oxford A. and P. at Oxford.

5 April—Methven A. and P. at Methven.

5 April—Flaxbourne A. and P. at Ward.

14 April—Mackenzie County A. and P. at Fairlie.

14 April—Strath-Taieri A. and P. at Middlemarch.

Winter Shows

11, 12, 13, and 14 June—Taranaki Metropolitan A. and P. at New Plymouth.

24, 25, 26, 27, and 28 June—Whangarei A. and P. at Whangarei.

The Cherimoya: A Delicious Dessert Fruit

THE cherimoya when eaten fresh is considered by many to be among the finest of the sub-tropical fruits. In several parts of Northland and also in the Bay of Plenty cherimoya trees are in bearing and many fruits more than 2lb. in weight have been produced. The tree is indigenous to the mountains of Peru and Ecuador and is now widely distributed in sub-tropical areas of the world. The following article by P. Everett, Orchard Instructor, Department of Agriculture, Auckland, describes this interesting species.

Fruit on a cherimoya tree near Whangarei photographed in October when foliage from the previous year had fallen and new growth was beginning. Some of the largest fruits had been picked.

THE cherimoya is known botanically as *Annona cherimola* Mill. Although the name "custard apple" is sometimes given to the cherimoya, it is more correctly applied to other species of the *Annonaceae* family. Included in this family are many other species which produce edible fruit, but with the exception of the cherimoya all these require a relatively hot climate and have not been established in New Zealand. The cherimoya requires sub-tropical conditions and is reported to suffer serious injury if exposed to temperatures lower than 26 or 27 degrees F. Even 1 or 2 degrees of frost may cause serious damage to young seedling trees. The tree is semi-deciduous, many of the old leaves generally being retained until shortly before the new growth begins. In size and habit of growth the tree somewhat resembles the apple, although the branches are generally more spreading and the foliage larger and more attractive in appearance.

The small pendulous flowers are yellow to green and produce a most pleasing scent. They are borne both on the current season's growth and on 1 year and older wood. Flowering begins in October and may extend over several months.

The fruit may be heart-shaped, oval, conical, or irregular and weigh from ½lb. to about 2lb. In some overseas countries single cherimoya fruits weighing more than 4lb. are relatively common, and specimens up to 16lb. have been reported. The skin is a light green when ripe and the flesh is white, juicy, and melting, with a rich and pleasant sub-acid flavour. There are many large brown seeds near the centre which are easily separable from the flesh. Fruit exposed to cold temperatures may become dark brown or black as maturity approaches.

Cherimoya tree 2½ years from planting.

The cherimoya does not generally produce heavy crops, but the fruit is produced at a relatively early age. At Kerikeri in Bay of Islands County several seedling trees produced fruit within 3 years of being planted out in their permanent positions. The fruit, which is generally eaten fresh, reaches maturity during August, September, and October, when there is relatively little fresh fruit available.

Propagation

The tree is raised from seeds, which should be planted in early spring. Good germination is generally obtained without any special treatment and the seedlings should attain a height of 9in. to 12in. by the following winter. Seedlings raised in the open frequently die back to near ground level during their first winter and some die completely, even when grown in areas free from frost. It is therefore preferable to raise the seedlings in a glasshouse and transfer them to outside nursery rows after the first winter.

Seedling trees are reported not to produce the best fruit, although in New Zealand all the seedling trees in production are producing good-quality fruit. To make certain that the fruit will be of the desired quality the seedlings should be grafted or budded, the budwood being taken from the most productive branches of a tree known to yield a desirable type of fruit.

The seedlings can be grafted shortly after the spring growth begins, 1-year-old wood on which the buds are dormant being used. Budding can be done at the same period or during autumn. Seedlings are generally 2 or 3 years old before attaining sufficient size for working over.

Many named varieties of cherimoya are described in overseas literature and these vary greatly in many ways, including type, precocity, season of ripening, and resistance to cold. As none of these varieties has been established in New Zealand, it is not known whether the seedling types at present grown are the most suitable for the local climates.

Growing Conditions

Although established trees will withstand temperatures a few degrees below freezing point without serious injury, best results will be secured in frost-free localities. The tree can be successfully grown in a wide range of soil types, but good drainage is essential. Weed growth around trees should be suppressed, but deep cultivation is undesirable. Pruning should invariably be carried out in spring at the end of the short, dormant period when bud movement is noticeable. At the season of planting trees should be topped at a height of not less than 2ft. and the lateral branches should be reduced to about three in number and severely shortened. During the following 2 or 3 years pruning should be designed to produce a tree with a hollow centre and a framework of about five leaders. A moderate shortening of the leaders and a considerable thinning out of superfluous lateral growth are desirable. In later years only a light pruning is required and this should consist mainly of thinning out the lateral growth, particularly near the centre of the tree, and removing dead wood.

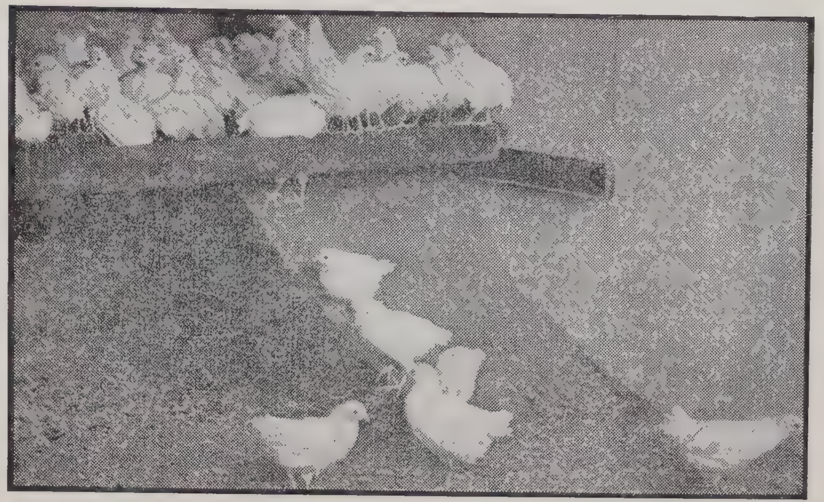
Diseases and Pests

No diseases have been known to attack the cherimoya in New Zealand. Thrips commonly attack the underside of the foliage and the growing fruits, producing a roughened silvery appearance. This pest may be controlled by spraying with nicotine sulphate 1 : 600, to which should be added soft soap 3lb. per 100 gallons; usually more than one application is necessary.

While it has been demonstrated that this sub-tropical fruit can be produced in favourable localities in New Zealand, the tree could not be recommended for commercial planting. However, when planted in large private gardens that are relatively frost-free it should prove both ornamental and useful. The novelty of this uncommon tree would also be an added attraction.

Production of Table Poultry

IN New Zealand most of the poultry offered for sale as table poultry is a by-product of commercial egg farming. Some poultry producers, however, are rearing birds solely for the table, and in this second article on the production of table poultry F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, discusses both methods. Producers often speak of "fattening poultry for the table", and the article describes how the term "fattening poultry" is often misunderstood, and deals with some of the misconceptions regarding the rearing of birds specially for the table poultry market.



[Green and Hahn Photography Ltd. photo.

Overcrowding and sleeping of chickens on the floor cause sweating and loss of condition. Chickens should be perched as soon as they have passed the brooding stage when 6 weeks old.

THE production of table poultry may be discussed under two separate sections, namely, surplus poultry from commercial egg farms, and specialised production.

Surplus Poultry from Commercial Egg Farms

As most table birds sold in New Zealand come from commercial egg farms, the class of table bird is dependent on the breed selected for egg production. White leghorns are very popular for egg production, and a high proportion of the table poultry available for sale is of this breed. Although flocks of Australorps also are commonly kept for egg production, it cannot be claimed that table poultry produced as a by-product of egg farms is first class.

Types of Birds

The commercial egg producer has two types of birds for disposal—discarded laying birds and male birds surplus to requirements for breeding.

The laying birds, culls at the end of a laying season, are sold as they are, without any attempt at fattening, which would not be warranted. Surplus male birds come into a different category, being much younger and consequently of better quality for eating. The quality of these birds will vary considerably, according to the age at which they are sold. White Leghorns should be marketed at 14 to 16 weeks of age, and not later than 18 weeks. At these ages the spurs will not have formed or the breast bones entirely hardened. Such birds may be roasted and provide a reasonable table chicken, being well fleshed if they have been properly reared. Heavy-breed cockerels on the other hand may be marketed between the ages of 16 and 18 weeks, but preferably not later than 20 weeks. The amount of breast meat carried by such birds will depend largely on how they have been managed and fed.

Fattening not Economic

On the great majority of commercial egg farms surplus males are not fattened. For White Leghorns no special fattening is recommended, as the results do not warrant either the labour or food expended. White Leghorns are not good table birds and no special form of management will make them so. A special fattening period is rarely practical for surplus heavy-breed cockerels, as they are usually culled from the main batch of growing birds when they are observed to be unfit for stud purposes, usually owing to some fault associated with breed characteristics. If sufficient birds of approximately the same age are available, fattening can be considered.

At this point, however, it is essential to face the economics of production. Fattening birds for a fortnight will improve the quality of the flesh, but will not greatly add to the liveweight. Unless, therefore, an increased price is expected for the improved quality, fattening is not economic.

In the United Kingdom, the United States, and other poultry-producing countries improved quality commands a better market, but it is highly doubtful whether this would be so in New Zealand at present. Therefore, the fattening of surplus cockerels on commercial egg farms usually cannot be recommended. Stress is laid, however, upon the desirability of marketing these birds before they become too old and their flesh hard and coarse. A supply of well-fleshed young cockerels will assist materially in making table poultry popular in this country.

Specialised Production

Before the feeding and management of birds raised specially for the table are described the general problems facing those interested in this side of poultry husbandry will be reviewed. The public purchase more poultry during holiday periods, particularly at Christmas. Unfortunately for the specialist table poultry producer Christmas in the Southern Hemisphere coincides with the flush season for surplus cockerels and to a less extent for cull hens from the commercial egg producer. This is much to the egg producer's advantage, as good prices rule during this period.

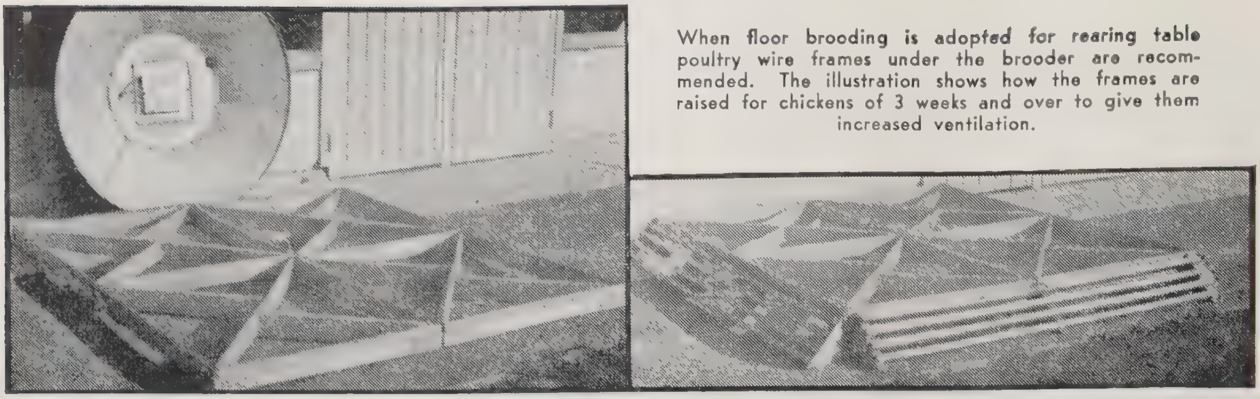
Production Difficulties Overseas

In the Northern Hemisphere on the other hand the flush season for surplus cockerels following the normal rearing season has past, with the result that birds have to be raised specially for the Christmas market, when they sell at higher prices. Also, in the Northern Hemisphere surplus cockerels from commercial egg production are not available during spring and early summer, when vegetables such as peas, which form an agreeable accompaniment to young chicken, become available. Prices for well-conditioned chicken reach their peak between March and June and specialist producers benefit accordingly. In New Zealand chickens are in short supply during winter, when there are no festive occasions and when vegetables, including those suitable for salads, are scarce. Table birds raised out of season have to be marketed during this period with a public which is not used to buying table poultry.

High Cost of Foods

Another problem facing the table poultry producer is the high cost of poultry foods, and during the past 6 or 7 years the shortage of foods. Fortunately at present the food-supply position is greatly improved. Unless the producer processes his own table birds, the employment of labour for plucking and trussing will add greatly to the cost of production.

Apart from general problems, the specialist producer has to consider management problems which arise at intervals throughout the year. These are intensified if the intention is to market a regular supply of birds each week of the year. Where specialised production is undertaken the insurance of a regular supply of day-old chicks of a suitable breed is the first consideration, and as little out-of-season hatching is done in New Zealand, this is a major management problem. Also to be considered is the fact that the average egg producer, from whom the table poultry producer gets his day-old chicks, does not run breeds which are most suitable for



When floor brooding is adopted for rearing table poultry wire frames under the brooder are recommended. The illustration shows how the frames are raised for chickens of 3 weeks and over to give them increased ventilation.

table birds. Usually, therefore, the producer of table poultry has the alternatives of raising birds in spring and autumn, using breeds maintained by the commercial egg farmer, or of establishing his own flock of breeders. If he raises his own flock, it is strongly recommended that Rhode Island Reds be kept and crossed with Light Sussex males. If he depends on supplies of hatching eggs or chicks from the commercial egg farmer, Australorps, Rhode Island Reds, or Australorps x White Leghorns are recommended.

The maintenance of a supply of chicks throughout the year requires considerable care and forethought. Adequate supplies of breeding males are essential, and breeding from mature pullets when hens are normally in the moult is the only method of ensuring a continuous supply of chicks. Allowance has to be made for reduced fertility and poorer hatchability during the out-of-season hatching. Chick mortality also tends to increase when pullets are first used for breeding during autumn and winter.

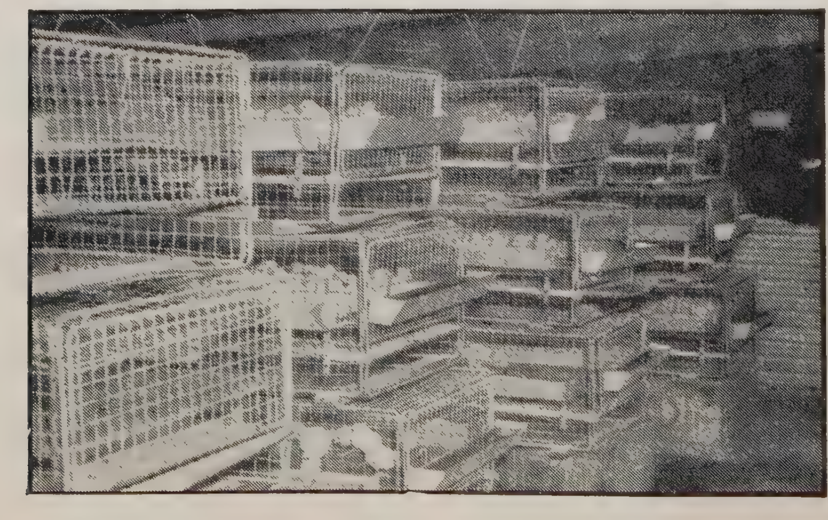
Enough information has been given to indicate that there are real problems associated with breeding, hatching, and rearing throughout the year. Pullet chicks are best raised as table birds, except those hatched in spring and autumn, which can be used as laying stock. Well-reared pullets (out-of-season birds) make excellent table birds, although not as heavy as the complementary cockerels. Pullets fatten well and carry a high proportion of meat.

Rearing Table Birds

It is essential to remember that chickens being raised as table birds require just as careful rearing as is given to future egg producers. Any of the usual methods of rearing may be employed, including battery brooders and carry-on cages. Such chickens may be reared intensively or allowed to run outside. If, however, the intention is to rear chicks at regular intervals throughout the year, it is perhaps desirable to employ wholly intensive methods if stale ground outside, caused by more than one brood being run over the brooder pens, is to be avoided. The same considerations apply to the growing stage. It is better to keep the chicks inside than to risk running them over the chick-sick runs or free range.

Size of Units

Out of season 150 to 200 chicks or more may be brooded quite satisfactorily, as in the normal rearing season, but much advantage will result from reducing the units to 50 or 100 birds after the brooding stage. Bigger units, especially where over-crowding occurs, result in leggy, poorly fleshed birds. Particular precautions should be taken against the occurrence of coccidiosis and worms. Both may cause trouble where chicks are being reared week after week in the same housing, but with correct precautions the risk can be reduced to a minimum. Strictly hygienic, dry conditions are essential.



Chick battery cages can be used successfully for brooding table poultry.

Good-quality Food Essential

For table birds to be an economic proposition they should grow rapidly and without a check at any stage. Good birds cannot be reared without good food throughout their comparatively short life. The idea that table chicken can and should be reared on makeshift rations is wrong. A sound chick ration of high quality including a protein content of 18 to 20 per cent. should always be used if good results are to be obtained. If it is considered that good-quality food is too high in price for raising table chicken, production should not be attempted. Poor-quality, cheaper foods give comparatively poorer results and are not economic.

Fattening Poultry

Another mistake which requires correcting concerns the term "fattening". Some people understand this to mean the feeding of growing cockerels with a fattening ration which will put on breast meat and fat. This is incorrect. All the breast meat on a "well filled" or "well conditioned" bird is put there during the normal rearing and growing period. The term "fattening poultry" refers to the special feeding given some 10 to 14 days before killing, when the quality not the quantity of the flesh is improved by the addition of fat under the skin along the breast and round the pelvic bones. When the bird is cooked this fat melts and seeps into the flesh, producing a moist palatable meat which is preferable to dry flesh, particularly when the latter is over-cooked. Foods high in carbohydrates such as maize, best-quality oats, and barley, with milk and even additional fat rendered down in the mixture. are used as fattening rations. Details of the method of fattening birds will be given in the next article in this series.

Handling Browntop Country in South Canterbury

By C. P. WHATMAN, Instructor in Agriculture, Department of Agriculture, Ashburton

THE dominance of browntop in the plant cover of an extensive area of the rolling downs and foothills of South Canterbury is indicative of a certain set of soil and climatic conditions which have their own management problems, some of which are discussed in this article. The suggestions made are the result of the experience of men who have been successfully handling this type of country for many years.

IN some places this browntop-dominant country is a strip 30 miles wide, in others only 10 miles wide, but it extends throughout South Canterbury and consequently covers an area of nearly 1000 square miles. Because of its extensive area and the fact that much of it is capable of improvement from third-class country to highly productive fat-lamb producing country, it is probable that there is more scope for increased production here than there is on the more fertile and more fully utilised and improved coastal areas. The country under consideration is somewhat remarkable in that certain areas of it in all districts, due to better management, are highly productive and present a striking contrast to most of the country. An analysis of the management on these areas suggests certain practices which could well be applied to a large proportion of the country.

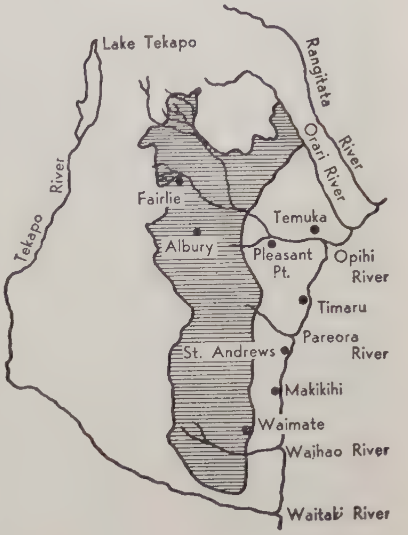
The soil cover is relatively thin, particularly toward the upper limit of the country, where it may be no more than 4 or 5in. The typical sward under unimproved conditions consists of a dense turf of browntop with a small survival of the better grasses and clovers, such as crested dogstail, ryegrass, white clover, and alsike, as well as flat weeds, Yorkshire fog, etc. Where cultivation has been poorly carried out creeping fog has come to occupy a considerable area. With this unimproved sward it is third-class country with a carrying capacity of about 1 ewe to the acre. It is late coming into production in spring and the pasture produces a relatively low yield of not very palatable or nutritious herbage. Stock generally do not thrive, lambing percentages are low, and few of the lambs are fattened without supplementary feed. In contrast to this state there are farms in the area carrying 3 or more ewes per acre as well as cattle and fattening all lambs on the mothers.

In the past this country has been cropped very extensively, wheat growing being often the major activity. In all cases the provision of winter feed made some cultivation necessary. It was done with horses, for which fairly large areas of oats were needed. To provide cash income wheat was used as a cash crop before the oats. To reduce the amount of cultivation needed new grass was sown, either with the oats or with turnips or rape, after the oats. This grass, frequently sown with inferior seed and on an unsuitable seed-bed, reverted quickly to browntop. Clover establishment and growth were negligible and pastures were thus not doing their work of fertility restoration and the process was quickly exhausting the original fertility.

Characteristics of Browntop Turf

As the browntop country is largely in a fairly high rainfall area, the weather is usually unsuitable for a rapid kill of twitch, a kill which is essential if new grass is to remain free from browntop for long. At the same time the browntop turf is a dense mat lacking in nitrogenous material and it breaks down only slowly in the ground. Hence it is desirable to have a fairly long period under cultivation before resowing in order:—

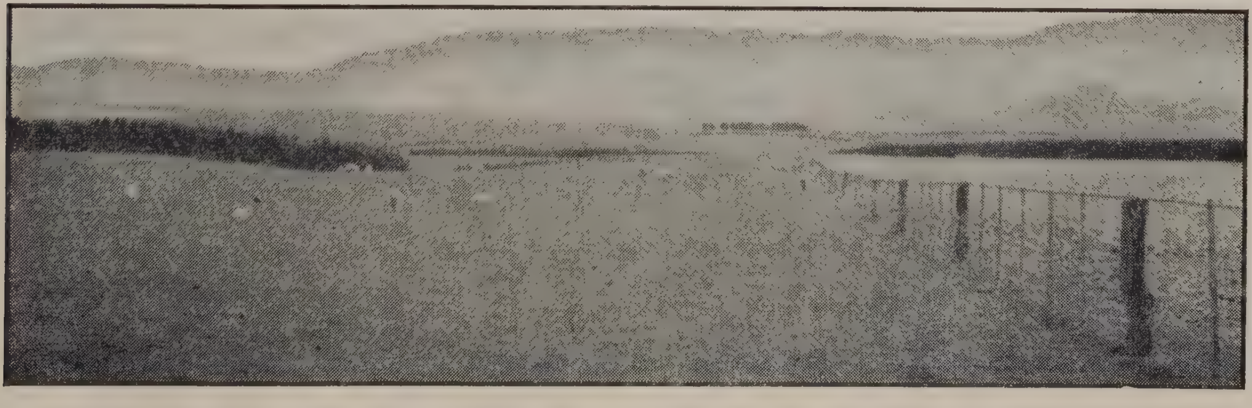
1. To get a kill of browntop.
2. To incorporate the turf in the soil in a decayed condition so that it will raise the fertility for the new sward.
3. To get the soil in such a state that the consolidation desirable for sowing grass is obtained. This consolidation is impossible until the old turf has decayed fully.



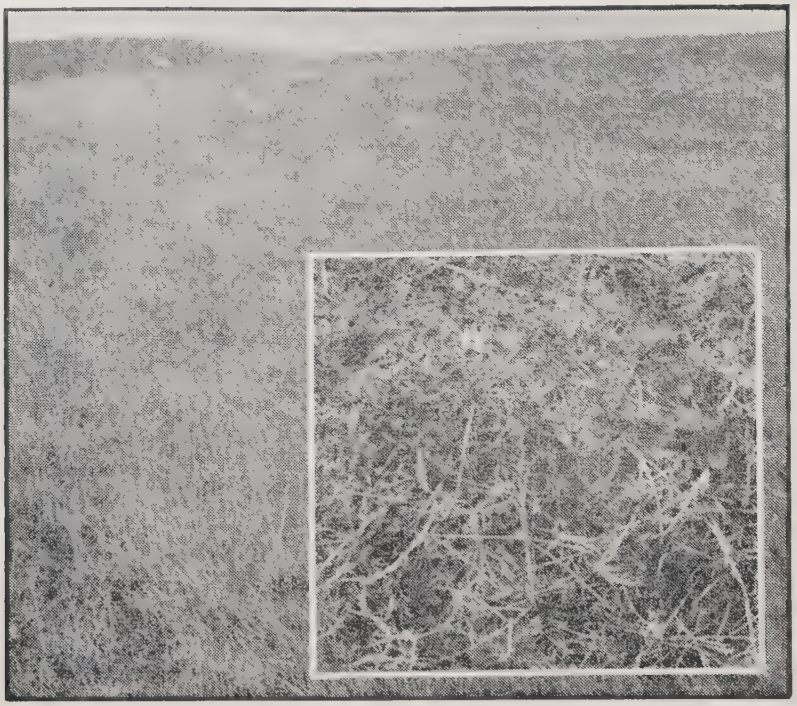
The shaded area of the map shows the browntop-dominant area of South Canterbury.

To achieve these conditions it is often desirable to grow a cash crop out of the browntop lea. Linen flax was most suitable for this purpose, as it did well under the conditions, it did not exhaust fertility, and was off the ground early. However linseed is not popular, as the harvest is late, which may mean running into periods of bad weather; barley or oats may be used. The cash crop will be followed by turnips, swedes and chou moellier, or rape. The winter feed crop in this position in the rotation usually will be more reliable than when it is grown out of lea, unless a long period of prior cultivation is carried out.

The feed crop raises surface fertility and the short fallow allows thorough preparation and consolidation of land for grass sown in the following January or February.



Fully developed country, showing the use being made of shelter belts and the neat and effective type of fences used.



Unimproved country which is very similar to the country shown in the illustration on page 173. Carrying capacity is less than 1 ewe per acre. Inset—Close up of the pasture. The sward is almost pure browntop with some flat weeds and moss.

Methods of Cultivation

There is some difference of opinion about the correct cultural practices on browntop country. Some believe in turning the browntop sward down very deeply and top working. Although this may be successful in some instances the disadvantages are:—

1. The soil generally is not deep enough to do this without bringing up too much clay.

2. The valuable humus-forming turf is buried so deeply that it decays only slowly and plant food eventually formed is too deep to be available fully to plants.

3. The turf tends to form a blanket between the subsoil and topsoil which interferes with the normal moisture flow from the subsoil and also makes it difficult to get the requisite consolidation in the lower levels of the soil.

More generally successful is top working of the browntop turf either by skim ploughing or with a stiff-tined grubber followed by ploughing to a depth of 4 to 7in., depending on the depth of the soil. Where this preliminary work is impossible due to a tough turf the digger plough, fitted with a skimming coulter and a revolving skeith, will do an excellent job and expose the maximum amount of soil to the influence of winter frosts. Subsequent cultivation with a stiff-tined cultivator pulled by an adequate power unit will complete the initial destruction of the browntop, provided that the weather is suitable. Care must be taken with spring work to ensure that the tilth does not become too fine with a resultant dense growth of yarr (spurrey). This effect is minimised by the maintenance of a correct lime status in the soil, which contributes largely to crumb structure and a good mechanical condition. With browntop, perhaps more than with other swards, the speed of working possible with a tractor constitutes a danger. Winter frosts and rains are the main factors responsible for the development of good tilth and, whether horses or tractors are used, time must be allowed for the natural forces to do their work.

Liming and Topdressing

The primary need of browntop country is for lime, and the initial dressing must be sufficient to bring the lime status of the soil up to a point where clovers will thrive. In practice it is found that an initial dressing of 2 tons of calcium carbonate per acre is sufficient in most cases. If the period in grass is short (up to 4 years), 1 ton applied before the next sowing down will be sufficient for maintenance. If grass is down for longer than 4 years, maintenance should be at the rate of from 5 to 10cwt. per year, applied usually as 1 ton every 2 or 3 years.

Effect of Liming on Soil Acidity

Soil testing for lime requirement gives valuable information about the effectiveness of previous applications of lime. The table on this page shows typical results of tests selected from many carried out during the last few years.

The pH is a measure of the degree of acidity of the soil. Although it has been shown that white clover will grow well with the pH as low as 4.5, it is generally recognised that for good white clover pastures the pH should be between 5.6 and 7. For red clover, the pH should be higher, between 6 and 7.5, and for ryegrass 6 to 7. In contrast with these figures, the optimum for browntop is from 4.5 to 6. The replaceable calcium figure, an indication of the amount of lime that has been absorbed by the soil, should be up to 7 in the majority of soils for optimum plant growth.

It is important to remember that applying lime and superphosphate to a browntop sward is practically a waste of money. Efficient use of fertiliser can be made only by a vigorous sward containing English grasses and clovers, and the lime and superphosphate available should be reserved for such pastures and for preparation for their establishment. In order that this necessary liming may be done it is essential that there should be an improvement in the availability of commercial lime or an extension of the use of home lime plants, a few of which are doing excellent work in the district. There are extensive outcrops of lime varying in quality between 60 and 80 per cent. of calcium carbonate scattered throughout South Canterbury.

There was a general opinion that phosphatic topdressing on browntop country in South Canterbury did not give economic results. This was true while the lime requirement was not satisfied, but those who have used lime effectively are now turning their attention to the use of phosphatic manures. Where land has been under a fairly intensive cropping programme and superphosphate has been used with the crops the phosphate status is fairly good. However, the browntop country generally has a sufficiently high rainfall to need a considerable quantity of phosphate. Hence phosphatic topdressing is the logical step

TYPICAL RESULTS OF SOIL TESTS FOR LIME REQUIREMENT

Farm	Paddock	History of paddock	pH	Replaceable calcium
1	A	Had never been limed	5.5	7
	B	Had had 1 ton of lime	5.6	5
	C	Had had 2 tons 12cwt. of lime in last 5 years	6.3	10+
2	A	Had never been limed	5.0	7
	B	1 ton of lime	5.5	7
	C	2 tons of lime	6.1	9
3	A	No lime	4.6	4
	B	1 ton of lime	5.3	8
	C	2 tons of lime	5.9	8
4	A	No lime	4.8	4
	B	2½ tons of lime	6.2	10+
5	A	No lime applied	5.2	3
	B	1 ton of lime in 1948	5.6	8
	C	1 ton of lime in 1939, 1 ton in 1948	6.2	8+

after the establishment of a satisfactory lime status. The usual application is 1cwt. per acre annually on fully improved pastures, but this may profitably be doubled, by giving an autumn application as well as a spring one, where stock management is sufficiently good to ensure utilisation of the increased grass production.

Drainage

The next stage in improvement in many places is undoubtedly drainage. Many of the flat paddocks and easy slopes are very wet in winter and tend to run to rushes. These paddocks are usually ideal for mole draining, having a stiff clay subsoil and a suitable fall. Greater interest is being taken in mole drainage on this country and it seems probable that there will be considerable expansion of this work in the near future.

Pastures

Pastures are the key to successful farming on this country as on other types of land. The ideal will not be obtained on the first sowing down in the improvement programme, but at the second the pasture obtained should be approaching the highest standard possible, if lime status and drainage have been corrected. When this has been done pastures can be renewed in rotation and the need for land for the winter feed crop, rather than the fact that pastures have become unproductive, will determine the ploughing-up programme. There are on typical browntop country pastures 15 or more years old which are still vigorous and highly productive. This is possible only by getting fertility to such a state that carrying capacity is 4 or more ewes per acre, so that a high concentration of stock is possible and the effects of dung and urine, together with regular additions of lime and superphosphate, create a state of fertility which is more than self-perpetuating. Features of these pastures are the unusually high degree of earthworm activity and the lack of weeds and inferior species in the swards.

The sowing of the old, false perennial ryegrass and reliance on volunteer white clover of poor type were two of the factors responsible for the bad reputation of this country—the belief that it "would not hold grass". The use of Certified strains of grasses and clovers is the only way to be assured of the length of life, vigour, and productivity desirable in a sward. The grade of seed to be sown will depend on whether seed is likely ever to be harvested from the areas. For purely grazing pastures, that is, in most cases, Permanent Pasture or Standard seed will be satisfactory.

The basis of the successful pasture is perennial ryegrass, sown at the rate of 30lb. per acre, and white clover, at 3lb. per acre. The pasture should be autumn sown without a cover crop after a short (summer) fallow or a long (winter and summer) fallow. Particularly on the first sowing down it will be advisable to reduce the perennial ryegrass sowing by 10lb. and replace it with short-rotation ryegrass, which will increase the production in the first year, enabling more stock to be carried and therefore giving a greater return of dung and urine to assist the future growth of the perennial ryegrass and white clover. In some, if not all, of the pastures Montgomery red clover should be included at the rate of 3 or 4lb. per acre, in which case the white clover can be reduced to 2lb.

Typical improved country, with foothills in the distance. This country before the principles of grassland farming were applied carried less than 1 ewe per acre. Inset—Close up of the pasture. Pastures are kept at this stage by the use of cattle.

The inclusion of Montgomery red clover spreads the production of the pasture over a longer period and assists in preventing a possible feed shortage in December and January. In almost all cases it is advisable to add crested dogstail at the rate of 1 to 2lb. per acre. The bulk of fodder produced by this grass is not great, but it is highly palatable and stock do very well on it. (Crested dogstail is a short-lived perennial grass and is able to maintain itself as a permanent constituent of the sward because it seeds very freely and because its seedhead stalks are virtually neglected by stock. It appears to inhibit the growth in the pasture of browntop, Yorkshire fog, sweet vernal, and other weeds by establishing itself on any bare ground.)

Where there is sufficient fertility to support long-rotation pastures cocksfoot and timothy become important and, indeed, almost essential constituents of the mixture. Cocksfoot produces well at all periods, but becomes particularly valuable in dry periods and during the latter part of the season. Timothy is a high producer on the wetter land. Suitable rates are 6 to 8lb. of cocksfoot and 1 to 2lb. of timothy per acre.

Broadcasting of the mixture is usually the best method of sowing, though drilling of the cocksfoot, followed by broadcasting of the remainder of the mixture, may be advisable. The sowing of at least 1cwt. of superphosphate will assist the rapid establishment of the young plants. One ton of lime should be broadcast just before the last harrowing and rolling before sowing.

Small-seeds Production

It is doubtful if the production of small seeds is justified on the browntop country in South Canterbury. Rainfall and other weather conditions make growing and harvesting unreliable. Stock carrying provides a dependable income and the maintenance of maximum stock numbers gives the heavy concentration of stock on good pastures that alone will raise fertility to a high level and maintain it at that level. The unseen losses through the withdrawal of stock and stock droppings from an area while it is shut for seed and the deterioration in a paddock due to seeding will make the production of small seeds unprofitable under average conditions.

The saving of browntop seed has provided a supplementary source of income in some seasons on this country, but under good husbandry there seems to be no place for it in the farm programme. An old browntop paddock produces a very poor yield, and under improved conditions the heavy-yielding paddock, for example, the paddock out of turnips which has run to self-sown browntop, will not exist;

also a grazed paddock will never produce a high yield of seed, and if maximum grazing is desired, there is little place for browntop seed production. At best browntop seed will provide a small and uncertain bonus for the obtaining of which expenditure of labour and equipment must be kept at a minimum. It is possible, however, that specialised management for the production of seed, on the lines of the management for the chewings fescue crop in Southland, may be successful on small areas.

Subdivision and Shelter

As this country in the past has been used largely for wheat growing and since then has been low in carrying capacity, subdivision in most cases is not good. Because of this, it is difficult to obtain adequate control of spring growth and a sufficient concentration of stock on an area. A 600-acre farm carrying 1200 ewes should be divided into paddocks of approximately 30 acres in order that a sufficient concentration of stock is possible when required. Extensive grazing will not result in maximum stocking or in the fertility build up that is being aimed at.

Another factor important in management is the provision of shelter. The rolling nature of the country and the presence of gullies in many places assist in this direction, but there is great scope for the planting of shelter belts and plantations, which will be of inestimable value at the crucial times of lambing and shearing. Practically all varieties of trees, apart from frost-tender species, do exceptionally well, provided relatively hardy species, such as *Pinus radiata*, are planted on the windward side to provide some initial shelter. Trees can also be used to control the spread, or assist in the destruction, of gorse on rough country where it tends to get out of hand.

Linen flax on browntop country.

Cattle

Many good farmers have found the carrying of cattle necessary for the full utilisation of pasture production. Cattle assist in controlling the flush of growth in spring, thus keeping growth in a suitable state for sheep. Most farms where cattle are run have areas of rough gullies and/or tussock country which cannot be controlled by sheep. Burning has been done, but cattle are much more satisfactory. In most cases breeding cows are kept and calves or yearlings are sold; in other cases young stock are bought and fattened.

METEOROLOGICAL RECORDS FOR JANUARY

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	63.2	— 1.7	83.9	42.9	2.02	9	— 2.48	0.93	8	245.8
Auckland	160	64.2	— 2.2	75.3	50.0	1.53	14	— 1.65	0.50	8	239.2
Tauranga	10	64.4	— 0.2	89.2	47.0	2.25	9	— 1.69	0.75	8	242.2
Ruakura	131	59.4	— 3.7	79.0	27.3	2.52	13	— 0.96	1.54	8	223.3
Rotorua	969	61.4	— 1.4	92.5	40.3	2.73	9	— 1.63	1.11	8	231.3
Gisborne	12	64.9	— 0.4	85.9	44.7	2.97	6	+ 0.43	1.42	14	268.4
New Plymouth	160	59.3	— 2.9	78.3	45.4	4.37	13	— 0.10	1.00	12	213.8
Napier	5	66.8	+ 1.3	96.0	49.2	1.89	6	— 0.72	0.96	16	276.6
Karioi	2125	55.6	— 1.4	80.0	34.0	3.07	11	— 0.61	1.26	17	
Wanganui	72	61.4	— 2.1	74.2	49.0	2.72	11	— 0.06	1.30	16	217.1
Palmerston North	110	60.2	— 2.2	76.5	47.0	3.12	17	— 0.08	0.68	13	178.4
Waingawa	350	60.2	— 2.2	80.8	37.0	3.20	11	+ 0.80	1.74	13	224.2
Wellington	415	59.4	— 1.6	77.9	45.5	1.89	9	— 1.19	0.79	8	216.4
Nelson	5	60.4	— 1.2	78.0	41.3	2.71	11	— 0.13	1.17	16	264.7
Blenheim	12	61.5	— 1.6	88.4	40.2	2.03	7	+ 0.04	0.68	8	250.7
Hokitika	12	55.0	— 3.1	73.7	40.1	10.32	22	+ 0.60	1.96	5	172.3
Hanmer Springs	1225	56.9	— 2.8	82.0	34.0	3.50	10	— 0.03	1.26	8	226.5
Christchurch	22	59.8	— 1.6	82.4	39.3	1.73	9	— 0.50	0.87	8	227.0
Ashburton	323	59.0	— 2.0	85.2	38.2	2.15	8	— 0.48	1.21	8	225.4
Timaru	56	59.0	— 1.6	94.1	36.0	4.00	9	+ 1.63	1.19	3	199.5
Alexandra	520	60.2	— 1.5	89.6	40.0	1.13	12	— 0.71	0.30	3	223.3
Taieri	80	55.8	— 1.9	80.9	36.8	2.95	17	+ 0.57	0.73	3	169.1
Invercargill	32	55.8	— 2.5	77.0	37.0	5.45	21	+ 1.60	0.64	7, 28	172.4

Rotations

The rotation is dictated largely by the necessity to provide winter feed, up to one-tenth of the area of the farm being required for this purpose each year. Greenfeed is required for winter and spring and is supplied by young grass, together with Italian ryegrass or Algerian oats grown for greenfeed. An area of old grass equal to the winter-feed area sown and to the amount of young grass sown down is ploughed up each year. This gives a pasture life of 6 to 8 years, provided that the whole farm is arable. In the frequent cases where part of the farm consists of unploughable country the life of the pasture on the arable area is reduced correspondingly if the farmer is growing the full area of winter feed that he requires.

Until a stage is reached when lamb-fattening crops are no longer required, provision must be made for the growing of rape. A suitable rotation in the first stage of improvement is as follows:—

Old browntop turf to
    cash crop (for example, linseed)
Cash crop to
    ½ rape and Italian ryegrass
    ½ swedes and chou moellier
Summer fallowed and sown down

When carrying capacity has been built up it may be no longer advisable or profitable to use a cash crop as part of the preparation for grass. The area of rape can also be reduced as more lambs are fattened on the mothers. The rotation can then be simplified by growing the winter feed crop out of old pasture and by growing some rape and greenfeed, summer fallowing the whole area, and resowing to grass. Variations of the suggested rotations of course will be made to suit individual requirements, but the aim must always be preparation for grass.

The basis of the improvement of browntop country is the establishment and full utilisation of high-producing fertility building pastures. Such pastures can be secured only as the result of thorough cultivation, the use of lime and phosphatic fertilisers, and the sowing of high-producing strains of grasses and clovers.

Scope for More than Million Pigs in New Zealand

THERE has been a tendency since the Second World War to assume that, because of the rapid increase in the processing of dairy by-products, particularly as dried skimmed milk, buttermilk, casein, etc., the quantity of dairy by-products left for pig feeding is diminishing. Though this is undoubtedly true in certain districts where the change is most marked, the over-all position is strong. Dairy cow numbers have reached a record figure and are rising, and the increase in production has been sufficient to offset the effect of alternative uses of by-products. In this article A. Longwill, Superintendent of the Pig Industry, Department of Agriculture, Wellington, provides a detailed background from which he concludes that there are no grounds for pessimism about the future of the industry in New Zealand and that there is scope for considerable improvement immediately.

[*National Publicity Studios photo.*

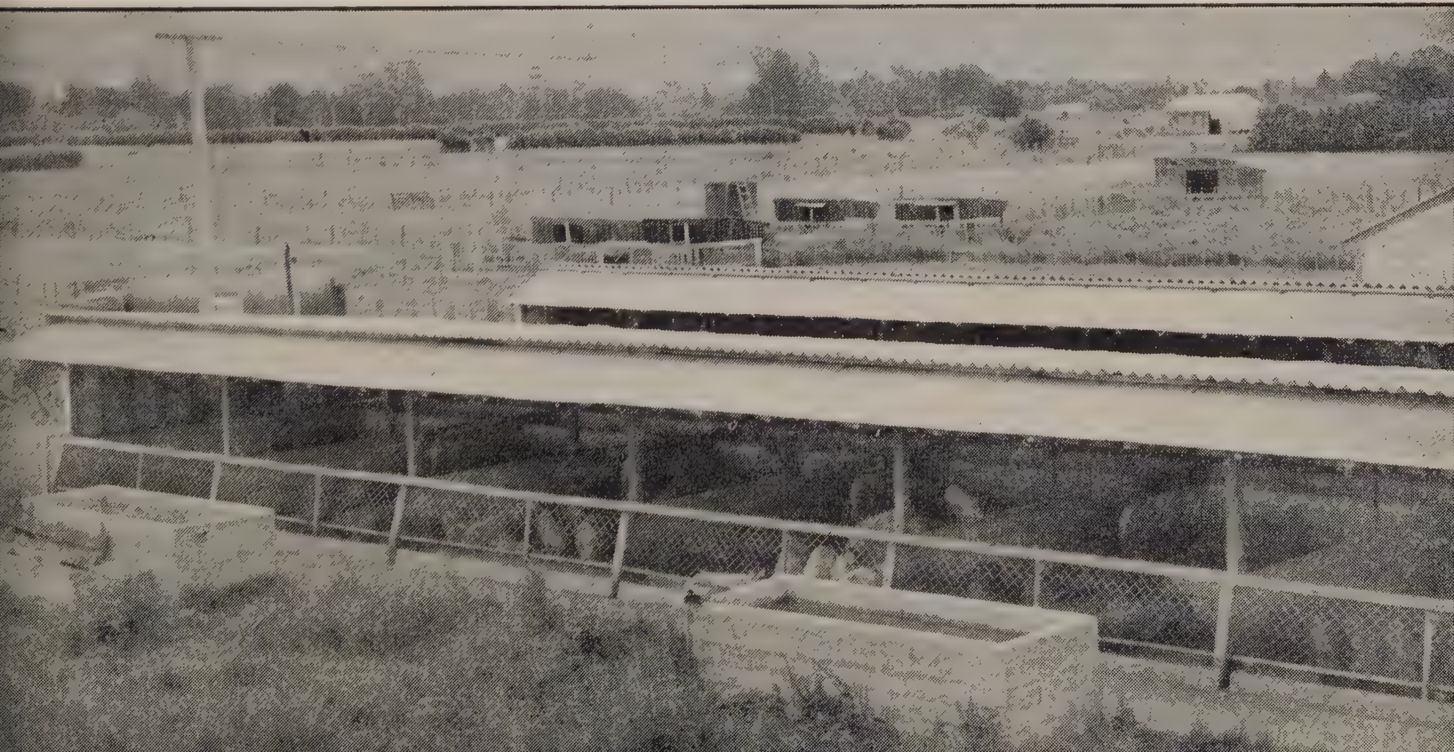
Increasing dairy cow numbers and rising production have been sufficient to offset alternative uses of by-products used for pig feeding.

AFTER a peak reached in 1936 at the end of a serious economic depression the numbers of dairy cows and pigs kept on New Zealand farms showed a decline. Between 1936 and 1946 this was of the order of 10 per cent. in dairy cows and as high as 35 per cent. in sows. Though the decline in dairy cow population was arrested in 1946 and began to rise after 1947, no significant rise was shown in sows until 1949. These trends are shown in Fig. 1.

The ratio of sows to cows fell from 1 : 16 to 1 : 26 between 1936 and 1949, being arrested only in 1949. This reflects partly the effect of alternative uses of dairy by-products and increased production of whole milk for town supply, and also a decline in interest in pig production, this being a relatively unattractive section of farm enterprise.

Although sow numbers decreased steadily from 1936, there was no serious decline in pig-meat production until the last years of the war. In fact, a record tonnage was reached in 1941, largely in response to the call for a larger proportion of baconers. Uncertainties of shipping in the first half of 1942 led to much frustration and contributed to the drift away from pigs. Labour and transport difficulties became more and more acute in New Zealand. Between 1941 and 1946 pig-meat production had fallen from 52,600 tons to 38,400 tons. Sows had reached a critically low level. Much food was being wasted in the flush of the dairy season and many heavy, over-fat baconers were being produced.

Though up to 1941-42 there had been a gradual improvement in efficiency of the use of dairy by-products available, there has been since then a dangerous falling away in this efficiency of conversion. Table I gives details of pig-meat production since 1928, and is worth careful study. It not only traces the fluctuations which have occurred in

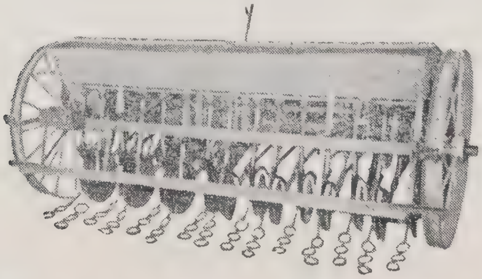


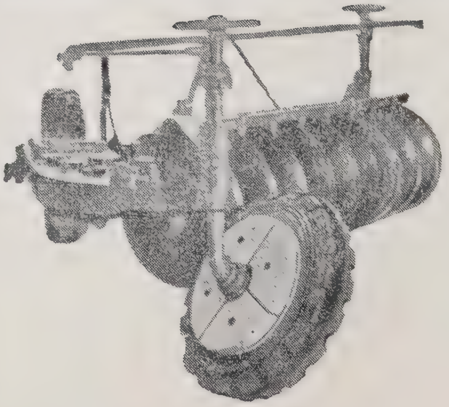
BELOW: With efficient stock, housing, management, and correct and careful feeding a standard of 1lb. of meat for only 5lb. of feed used is possible.

Massey-Harris WORLD KNOWLEDGE AND EXPERIENCE
brings you these two farm-bred implements

MASSEY-HARRIS No. 720A DRILL

15 and 20 row combined grain and fertiliser drill; widths 10ft. 5in. and 13ft. 2in. Four combinations for sowing fertiliser in 25 quantities from 50 to 800 lbs. per acre. Multiple gear disc wheel with 13 rows of teeth giving 13 speeds. Double force feed runs to each disc. Grass seed box and small seeds box available as extras.



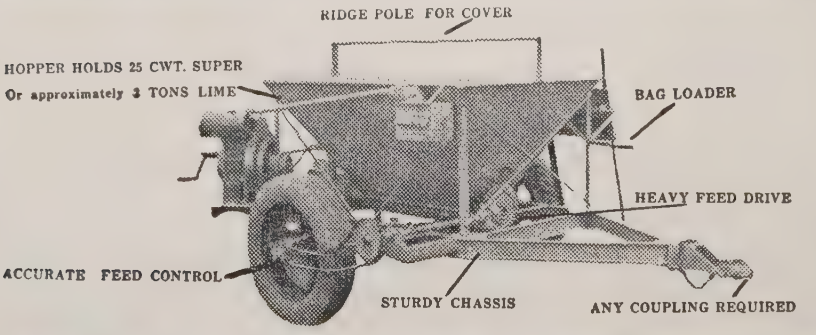


MASSEY-HARRIS One-way DISC

Turns up the soil quicker after harvest, saving plough shares. Eliminates stubble nuisance. When fitted with seed box, sows oats, lupins, and grass seed in quick time. Balanced 3-point suspension, floating and automatic flexible hitch, positive-action power lift, and convenient depth control.

MASSEY-HARRIS CO. LTD.

Head Office: CHRISTCHURCH. **Branches:** AUCKLAND, PALMERSTON NORTH, DUNEDIN. Agencies Everywhere. (P. & D. Duncan Implements are sold exclusively by Massey-Harris Co. Ltd.



- SPEED
- ACCURACY
- ECONOMY
- EFFICIENCY

"HEWCO" FERTILISER DISTRIBUTOR

The "Hewco" Fertiliser Distributor is the solution to all topdressing worries and has been thoroughly tried and tested under all conditions. One man can operate the "Hewco" easily and efficiently, and the "Hewco" can be towed by ANY tractor. It will go and sow wherever a tractor will go, giving accurate feed and an even, measured spread at all speeds. The "Hewco" is of all welded steel construction, and a Bag Loader is fitted as standard equipment.

A Petter engine powers the spinner and the feed worm shaft is driven by one of the land wheels. A DETACHABLE 2½ ton axle and wheel assembly is fitted.

To: Huntly Engineering & Welding Co. Ltd., 2 Park Avenue, Huntly.

Without obligation please send me full particulars of the "Hewco" Fertiliser Distributor.

Name ....

Address ....

....

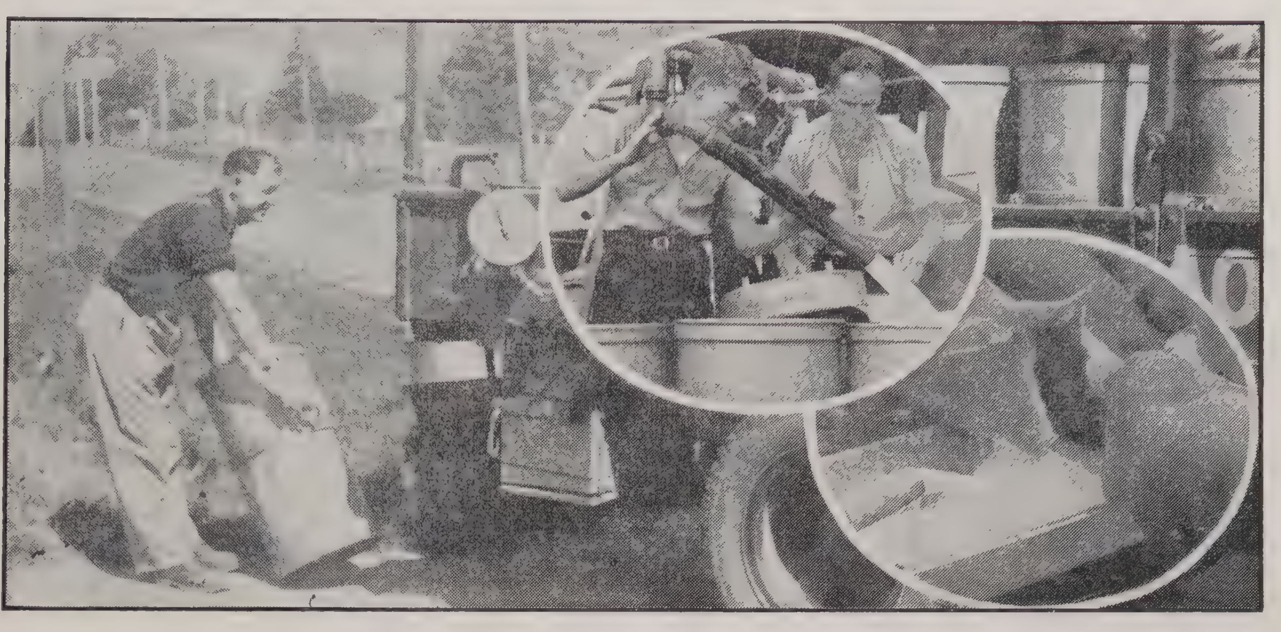
J.A.2/52

Further particulars will be gladly sent on application to the makers of "Hewco" products.

HUNTLY ENGINEERING & WELDING CO., LTD.

2 Park Avenue, Huntly. - - 'Phone 285.

DISTRICT AGENTS: Lees Bros. Ltd., Papakura; T. B. Hodgson Ltd., Piopio; E. A. Batson Ltd., Hastings; Northern Machinery Exchange Ltd., Whangarei.



[*Inset at right Department of Internal Affairs photo; remainder National Publicity Studios photos.*

Efficient use of dairy by-products can be assured only by having enough pigs during the flush months of milk production. Much whey is at present not being used.

sow and cow numbers and in pig meat produced, but gives a picture of the variations in efficiency and an indication of the trend upward once again in numbers of cows and sows.

Because of the higher proportion of porkers produced in the last meat year, the tonnage does not show an increase commensurate with the increase in number of pigs killed, but the fact that there were more pigs bred offers hope that more pigs will have again been available to consume the peak supply of dairy by-products in the current season. It is only by having enough pigs available during the flush months that anything like efficient use of the dairy by-products can be achieved.

With this introduction, it will now be interesting to study the supply of dairy by-products and how these are utilised.

Production and Disposal of Dairy By-products

Table 2 gives the details of production and usage of dairy by-products averaged over 5 pre-war years compared with two seasons at the end of the war and the latest complete season. The data are shown in Fig. 2. In this graph the left half of each column shows the production and the right half the usage of each type of by-product.

Essential points are:—

1. The overwhelming importance of skimmed milk, which represents 75 per cent. of the total dairy by-products available for pig feeding.

2. Though total dairy production fell off during the war years compared with before the war, it has since recovered and is now well ahead of the pre-war average.

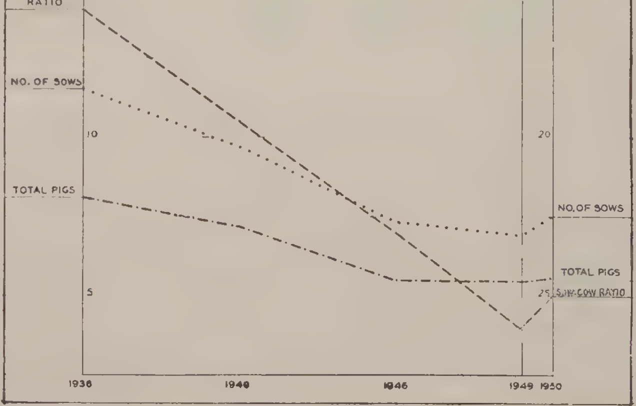
3. Though considerable increases have taken place since the end of the war in the processing of various by-products, the increase in dairy production over this period has more than offset the drain on the pig food supply. There was, in 1950-51, however, in spite of its being a record dairy production season, 6 per cent. less dairy by-product food supply for pigs than in the peak period before the war.

4. The largest proportional change from the pre-war position is in the case of buttermilk, of which approximately one-third was dried during the 1950-51 season. The change in the supply of skimmed milk available for pigs is much more serious, however, and the increased manufacture of skimmed milk powder and casein has reduced the quantity available to 53.5 million gallons less than before the war. If all the buttermilk had been dried, it would not have created as big a gap in the food supply as this.

5. The quantity of whey available is greater than ever before.

From the facts given there is no good and sufficient reason in the food supply situation for the decline of nearly 30 per cent. in numbers of pigs slaughtered and of nearly 20 per cent. in weight of pig meat. Further, with the increase taking place in dairy herds and improved pastures and pasture management methods the potential for increased dairy production is very considerable. In view of this there is no need to be despondent about the future of pig production. There is some ground for fear that the markets for dried dairy products may soon reach saturation, and it is thus doubtful if their expansion will keep pace with

FIG. 1—TRENDS IN TOTAL NUMBERS OF DAIRY COWS AND SOWS, SOW: COW RATIO, AND TOTAL PIGS IN NEW ZEALAND, 1936-50



the continued development of the dairy industry in this country.

It will be interesting, therefore, to examine what might be regarded as the potential production of pig meat on our existing type of feed supply.

There is, in practice, a very wide range of levels of efficiency in feed conversion from farm to farm. Tables 3 (a) and (b), based on information collected in the pig census carried out before the war, indicate the range that occurs according to efficiency of management generally and different levels of supplementing the basic food supply. Table 3 (c) gives the average efficiency of these farms, together with the proportions of the various types of feed contributing to the total feed supply. On this basis, 8lb. of food was used for each 1lb. of pig meat produced. Though not a high standard, this is better than the average for the country as a whole, as is evidenced by the fact that had this standard been attained generally the level of production would have been higher than it actually was in each of the seasons under consideration (see Table 5).

With the combination of efficient stock, housing, management, and correct and careful feeding it is possible to achieve a standard of 1lb. of meat for only 5lb. of feed used, assuming that production is on the basis of two porkers (average 86lb. carcass) to one baconer (148lb. carcass). The details of feed consumption at various stages under such ideal conditions are set out in Table 4. The important point is that although the standards here are well above average they are not impossible of achievement, as many strains of pigs, under careful tests, have performed as well as, or even better than, this.

National Position

Table 5 sets out for the same seasons covered in Table 2 the quantities of dairy by-products available for pigs each year and estimates of the amounts of concentrates and other crops and grass which were actually available for pig feeding. Estimates have had to be made in all cases, as obviously only portion of the crops grown, meals produced, etc., is used for pig feeding. In all cases of the bulk farm-grown foods much greater quantities were actually available and could have been used for pigs if desired. However, to give some indication of the method of estimating the amounts actually used the consumption of grass, which is, under New Zealand conditions, the predominant farm-grown item of the food supply, may be considered. This has been based on the following estimate:—

		Food units	Total (thousand food units)
74,000 sows	Dry period ..	240	
	Suckling	60	
		300	
That is, 600 food units per year ..			44,000
300,000 winter stores 300 food units per pig, assuming that all roots and half season's supply of meal is used over this period (based on 1950-51 figures)			33,600
140,000 growing pigs during dairy season at 50 food units per pig ..			22,000
			100,000

TABLE 1—PIG-MEAT PRODUCTION IN THE LAST 24 YEARS

	As at 31 January			For year ending 30 September				
Year	Sows over 1 year old	Dairy cows in milk	Ratio of sows to cows in milk	Pigs slaughtered	Pig meat produced (tons)	Meat produced per sow (cwt.)	Food units per lb. of meat (dairy by-products only)	Meat per 100lb. of butter-fat (lb.)
1928	82,404	**1,242,729**	**1 : 15**	476,828	23,835	**5.8**	7.4	23
1929	74,692	1,291,204	1 : 17	518,025	25,560	6.8	7.6	23
1930	61,706	1,388,872	1 : 23	515,428	25,700	8.3	8.5	20
1931	64,981	1,499,532	1 : 23	525,286	24,830	7.7	9.0	19
1932	75,409	1,582,664	1 : 21	**474,094**	**22,850**	6.1	**10.3**	**17**
1933	87,686	1,733,913	1 : 20	635,282	29,640	6.8	9.4	19
1934	98,299	1,816,402	1 : 18	772,369	35,500	7.2	8.6	21
1935	111,793	1,827,962	1 : 16	919,929	40,868	7.3	7.2	25
1936	**116,058**	1,823,358	1 : 16	1,038,236	46,864	8.1	6.6	27
1937	112,921	1,805,405	1 : 16	1,060,057	47,557	8.4	6.8	26
1938	104,803	1,763,775	1 : 17	**1,090,524**	47,896	9.1	6.3	28
1939	96,754	1,744,478	1 : 18	962,257	42,582	8.8	6.4	28
1940	92,759	1,739,874	1 : 19	873,304	49,437	10.6	5.9	**30**
1941	100,378	1,779,603	1 : 18	1,006,686	**52,623**	10.5	6.0	29
1942	91,338	1,777,239	1 : 19	925,982	47,978	10.5	**5.7**	28
*1943	82,023	1,714,959	1 : 21	772,744	44,320	10.8	6.1	29
1944	77,281	1,647,920	1 : 21	740,913	43,251	11.2	5.9	**30**
1945	77,202	1,678,943	1 : 22	681,230	42,378	11.0	6.8	26
1946	72,573	1,661,944	1 : 23	664,275	38,437	10.6	6.3	28
1947	**67,938**	1,657,690	1 : 24	645,728	39,491	11.6	6.9	26
1948	68,354	1,713,532	1 : 25	650,466	40,384	11.8	6.9	26
1949	68,305	1,746,753	**1 : 26**	686,237	42,618	**12.5**	7.1	25
1950	74,112	**1,845,510**	1 : 25	689,805	42,100	11.4	7.4	24
†1951				719,586	41,614		7.5	24

* From 1943 onward estimates of stock in boroughs have been excluded.

Tonnage figures up to 1934 are round-figure estimates. Since 1935 the estimates have been based on calculated average weights of porkers and baconers slaughtered.

† Before adjustment to new basis.

Figures in bold type represent low and high points over this period.

TABLE 2—NEW ZEALAND DAIRY BY-PRODUCTS AND THEIR DISPOSAL

	5 years 1933–34 to 1937–38	1943–44	1944–45	1950–51
	(millions of lb.)			
SKIMMED MILK				
From butter	6,472	5,307	5,826	6,704
From cream for human consumption ..	50	64	65	102
From cream used in ice cream	3	7	6	8
	6,525	5,378	5,897	6,814
Usage				
Skimmed milk powder	120	183	221	587
Calves, skimmed milk	300	306	352	391
Casein	300	80	108	564
Fowls, sundry (estimate)	10	12	12	12
	730	581	693	1,554
Left for pigs	5,795	4,797	5,204	5,260
WHEY				
From cheese	1,673	1,676	1,840	1,932
From casein	302	76	103	536
	1,975	1,752	1,943	2,468
Usage				
Whey for sugar of milk	—	81	86	221
Whey for calves	79	71	81	81
	79	152	167	302
Left for pigs	1,896	1,600	1,776	2,166
BUTTERMILK				
From butter	425	350	393	459
From whey butter	6	7	8	9
	431	357	401	468
Usage				
Buttermilk powder	—	4	6	164
Left for pigs	431	353	395	304
CONCENTRATED VILAC (mother liquor)				
From sugar of milk	—	4	5	12
Usage				
For other stock	—	1	2	8
Left for pigs	—	3	3	4

Proportions in Food Supply

Alongside the total quantities available of dairy by-products, meals, etc., and farm-grown crops and grass is shown the percentage of the total feed supply represented by each sub-total. This was, in round figures, 80 per cent. of dairy by-products, 5 per cent. of meals, and 15 per cent. of crops and grass. For efficient utilisation of the basic dairy by-products the amounts of concentrates, roots, and greenfeed could be increased many times with benefit. Although this is not economically practicable at the moment, the fact should not be overlooked when pig-meat potential is being considered that should the economic conditions change so that the dairy by-products could be supplemented with other foods to the optimum nutritional balance, pig-meat production could be quadrupled.

Even at present levels of costs and prices it would be possible economically to double the proportion of meals used if these were available. But as, under the existing economic circumstances, they are unlikely to become more plentiful, consideration of potential production must be based on the level of availability existing in recent years. Use of home-grown crops and grass could be expanded and in the process of replacing old pastures with new, improved strains crops to be cashed through pigs could well be included.

The more crops are used the more essential it is to get full value from the meat meal available. In recent years meat meal has not always been used for its most useful purpose, that of supplementing protein-deficient whey and farm crops to ensure that the diet is balanced to produce optimum growth. Though meat meal may form part of the meal supplements for creep feeding on the skimmed-milk feeding farm, it should not, under the existing situation of shortage of protein supplements, be generally preferred to grains as a supplement to skimmed milk. With the exception of sows in the latter half of gestation and

FIG. 2—NEW ZEALAND DAIRY BY-PRODUCTS, SHOWING PRODUCTION AND DISPOSAL, 1933-34, 1937-38, TO 1950-51

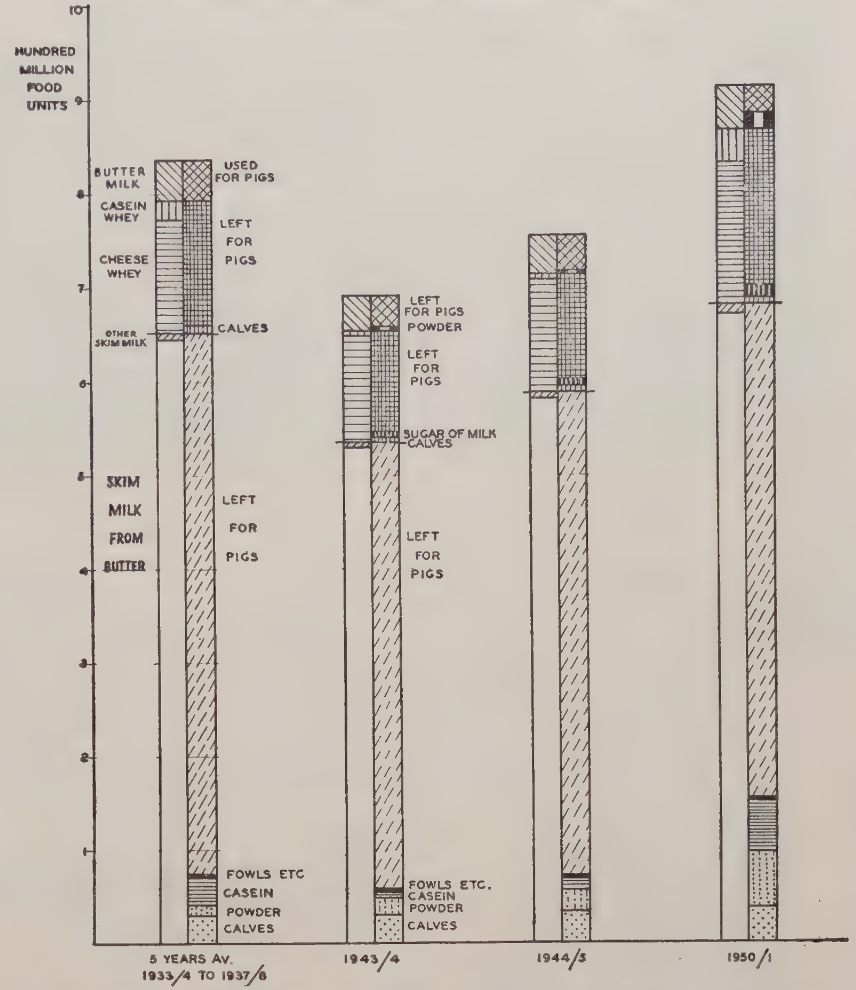


TABLE 3 (a)—POUNDS OF FEED USED TO PRODUCE 100lb. OF PIG MEAT. FARMS GROUPED ACCORDING TO LEVEL OF PRODUCTION PER 100lb. BUTTERFAT

Lb. pig meat per 100lb. of butterfat	Under 20		21–40		41–60		61–80		81 and over	
Number of farms (182)	16		72		60		26		8	
Food units as milk (gallons)	1,512	90%	805	86%	524	82%	380	75%	248	60%
Food units as meal (lb.)	56	3%	35	4%	39	6%	49	10%	51	12%
Food units as other foods (lb.)	112	7%	87	10%	73	12%	66	15%	140	28%
Total food units	1,680	100%	927	100%	636	100%	495	100%	439	100%

(Data from National Pig Census, New Zealand, 1938. M. J. Scott)

TABLE 3 (b)—POUNDS OF FEED USED TO PRODUCE 100lb. OF PIG MEAT. FARMS GROUPED ACCORDING TO PERCENTAGE OF MEAL IN RATION

% of total food as meal	under 5		5-10		11-20		21 and over	
Number of farms (182)	99		55		19		9	
Food units as milk (gallons) ..	704	85%	570	84%	452	80%	475	74%
meal (lb.) ..	15	2%	49	7%	85	15%	162	25%
other (lb.) ..	108	13%	63	9%	40	5%	9	1%
Total food units	827	100%	682	100%	575	100%	646	100%

(Data from National Pig Census, New Zealand, 1938. M. J. Scott)

TABLE 3 (c)—FEED USED PER 100lb. OF PIG MEAT. AVERAGE OF 182 FARMS

Feed used per 100lb. of pig meat	Food units	%
Dairy by-product (skimmed milk eq.)	683	85.4
Meal	37	4.6
Other food	80	10.0
Total	800	100.0

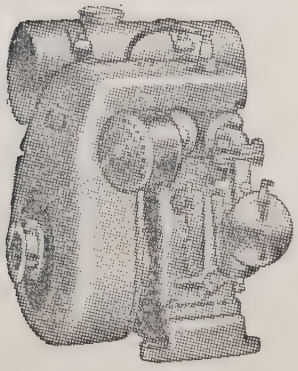
The New Scientific rat killer that

KILLS AT A TOUCH

Sprinkle RANTU around rat holes and runways . . . the rat picks up the dust, licks his feet and dies within 12 or 48 hours, usually outdoors. 100% effective. This special preparation of Alpha Naphthyl Thiourea is now available at all stores in 3oz tins or larger sizes.

Distributors: T. A. MACALISTER LTD.,
12 Albert St., Auckland.

For **AGRICULTURE**
For **INDUSTRY**



VILLIERS
LIGHT-WEIGHT ENGINES

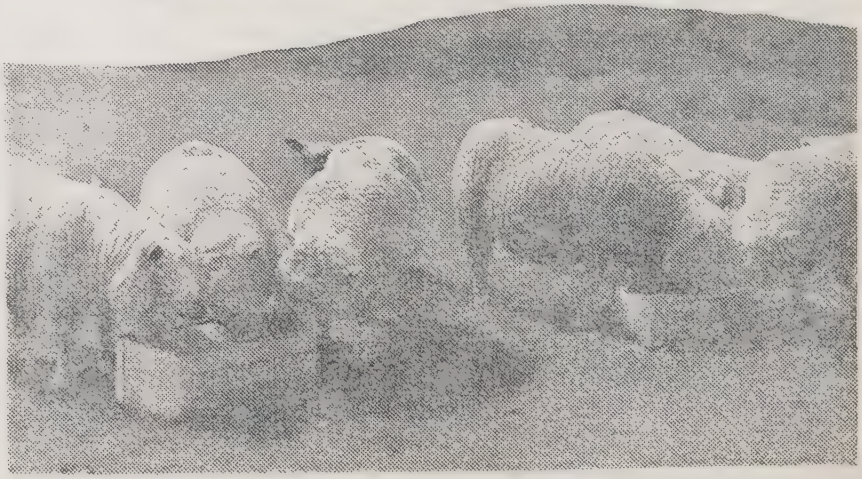
Villiers Will Power:

Generators, Water Pumps, Chain Saws, Vacuum Pumps, Cultivators, Shearing Machines, Rock Drills, Saw Benches, Concrete Mixers, Compressors, Spraying Equipment, Lawnmowers, Inboard Engines.
Obtainable in 1h.p., 2h.p., 2½h.p. Models.

Villiers

N.Z. Factory Representatives:
F. W. CAVE LIMITED,
P.O. BOX 1685, AUCKLAND.

To grow more wool . . .



put MOLACTRATE Proteinised Molasses Block out in the paddock . . .

Your sheep do the rest. Molactrate Proteinised Molasses Block is 15% wool growing protein. It's Molasses plus protein in solid form.

Order From Your Produce Merchant
the stock food that feeds itself

ONLY
Firestone
HAS BOTH!

The Traction Centre ↗

The New Open Centre ↘

The new advanced Firestone Curved Bar Open Centre features Exclusive Traction Arc Bars tapered and curved for positive bite and a strong hold in the soil. The flared tread openings between bars ensure automatic cleaning. If the famous Firestone Traction Centre Tractor Tyre best suits your needs, then you're in good company because, today, in excess of 2,000,000 are in regular use! The Firestone Traction Centre has a world-wide reputation for its ability to out-clean, out-pull and out-last any other make of tractor tyre.

Choose the
Firestone
CHAMPION

Ground Grip Tractor Tyre Most Suited To Your Farm Conditions.
FIRESTONE TIRE and RUBBER COMPANY of NEW ZEALAND LTD.

TABLE 4—STANDARDS OF FOOD CONVERSION UNDER IDEAL CONDITIONS (GOOD HOUSING AND EFFICIENT STOCK AND MANAGEMENT)

	*Dairy by-product	Meal	Grass or crop	Total
Dry sow:				
First 20 days (Per day)	5	1	2	8
Next 80 days (Per day)	2		3½	5½
Last 14 days (Per day)	4	2	2	8
Total for gestation period ..	316	48	356	720
Per pig, to birth (8 saved)	40	6	44	90
56 days, birth to weaning (50lb.) ..	70	20	10	100
56 days, weaning (50lb.) to porker (125lb.)	150	40	10	200
70 days, porker (125lb.) to baconer (200lb.)	400	—	30	430
Total to baconer weight ..	660	66	94	820

Assuming production in the following proportions:—

	Carcass	Food required
Two 125lb. liveweight porkers	172lb.	780
One 200lb. liveweight baconer	148lb.	820
	320	1,600

Food required per lb. carcass gain 5.0 food units

500lb. food is used to produce 100lb. of pig meat.

* 1 gallon of skimmed milk or buttermilk, or 1½ gallons of whey, equals 1 food unit.

during lactation, the protein requirements of a pig will be met by the inclusion of 2 gallons of skimmed milk in the daily feed.

Production Potential

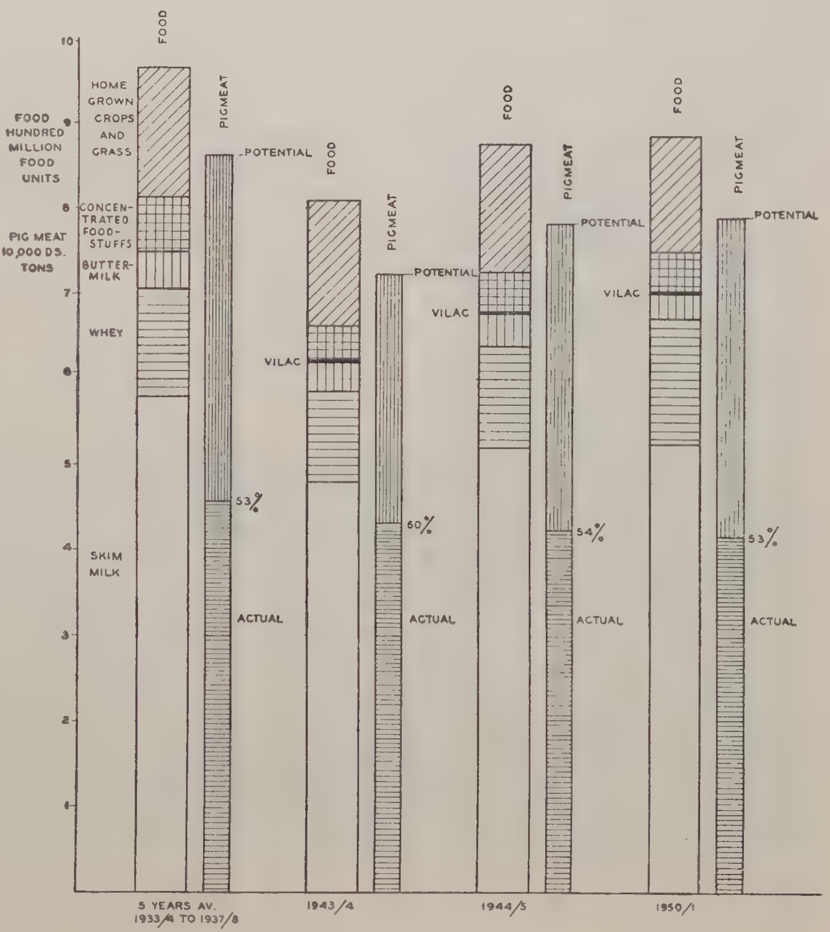
In the lower section of Table 5 are shown calculated tonnages of pig meat which could be produced on the total food supply available in the seasons shown at different levels of efficiency of conversion; that is, 8lb. of food, 6lb., and 5lb. per lb. of pig meat produced. Below these is shown the actual tonnage of meat produced during the year in question, and, finally, the percentage of the "ideal" production level (that is, 5lb. of food per 1lb. of pig meat), which is represented by the actual production each year.

These figures show that actual production has never reached the lowest level of efficiency used in these calculations, and if a study of this table does no more than to shock us into the realisation that we have never reached more than 60 per cent. of our potential pig-meat production on existing feed supplies, it will have served its purpose. That the best percentage utilisation was obtained in a bad dairying season indicates that one of the reasons for poor utilisation is that the industry is chronically short of stock to deal with the dairy by-products when they are available, and that it is not carefully enough adjusted to the fluctuations in that food supply.

Fig. 3 shows the data contained in Table 5 in graph form. Separate columns (on entirely different scales) are shown for food supply and pig meat—actual and potential—in each year. This brings out more clearly than all the figures or wordy arguments which could be brought to bear on the subject just how much leeway there is to make up in making efficient use of the food supply available.

Increasing numbers of dairy cows and improved pastures and management methods offer a great potential increase in milk production, and therefore of by-products for pig feeding.

FIG. 3—TOTAL FOOD AVAILABLE FOR PIGS, PIG MEAT PRODUCED, AND EFFICIENCY, 1933-34, 1937-38, TO 1950-51



In spite of increased alternative uses of dairy by-products there are still more of these available for pig feeding than at any previous stage, except in the peak years of the 1930's.

The limit of dairy production is very far ahead of present actual production, and increases are being made almost continuously. This is likely to more than offset further increases in alternative uses of by-products; therefore, the amounts available for pigs should increase and not decrease.

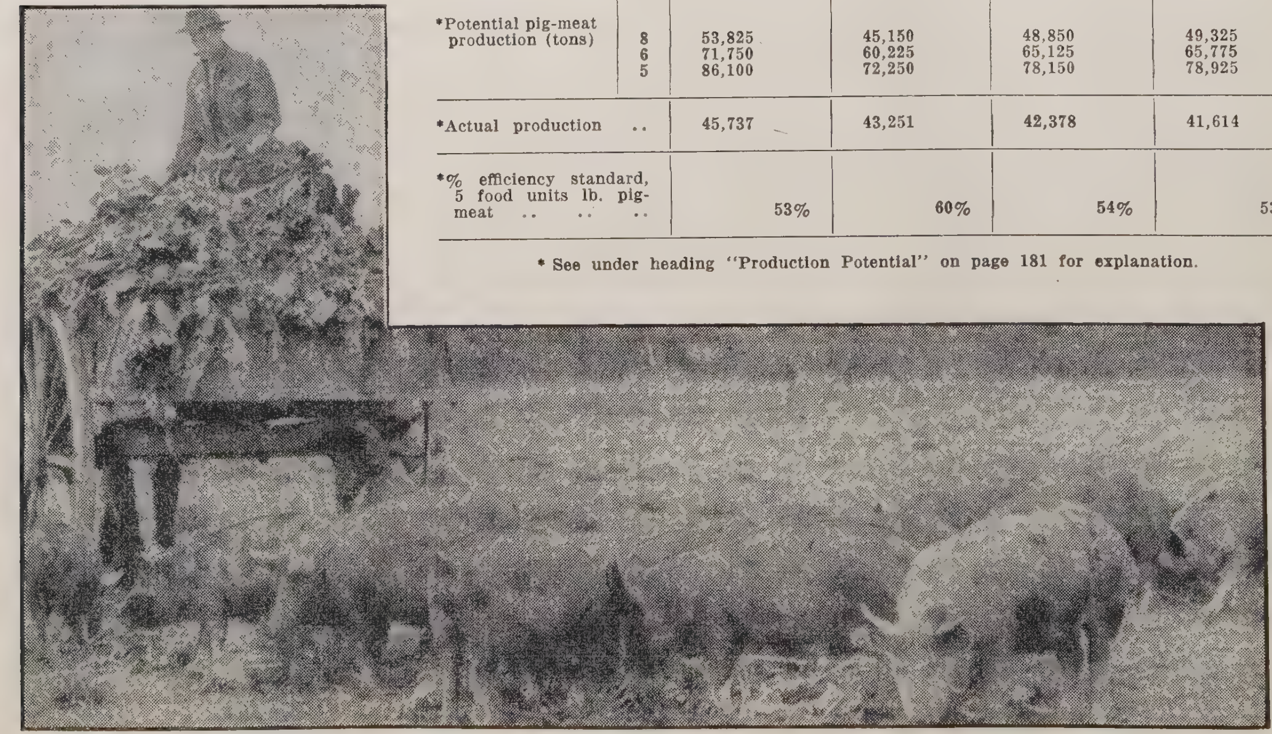
There is a sound market for all the pig meat we can produce. The policy of the National Pig Industry Council is to encourage porker production for export, and with full and efficient use of all the food supplies available it should be possible to produce 1,000,000 porkers and 500,000 baconers. This would enable an export surplus of 30,000 tons of porkers and 7000 tons of baconers to be built up.

To achieve this high degree of efficiency would, of course, take time, but above all it would require the determination to build an industry and the energy to put improvement schemes into effect. A scheme of stock improvement aimed at improving the efficiency and carcass quality of our pigs is a basic requirement, while there must also be improvement of housing, better general management and planning, including the adjustment of pig numbers carefully to the over-all balanced food supply, better care and feeding of the pigs at all stages, and hygiene and sanitation to reduce disease. These and the economic conditions to give incentive to this degree of interest in pig husbandry are necessary parts of the structure of an efficient industry.

TABLE 5—FOOD AVAILABLE FOR PIGS

———	Food units lb. pig meat	1933–34 to 1937–38		1943–44		1944–45		1950–51	
		(thousands of food units)							
Dairy by-products									
Skimmed milk		579,500		479,700		520,400		526,000	
Whey		126,400		106,667		118,333		144,400	
Buttermilk		43,100		35,300		39,500		30,400	
Vilac		—		1,500		1,500		2,000	
Total		749,000	77%	623,167	77%	679,733	78%	702,800	79%
Meals									
Barley		15,000		10,000		15,000		20,000	
Meat meal		20,000		20,000		21,000		18,000	
Peas		750		1,500		2,000		2,000	
Maize		1,000		750		1,000		1,000	
Copra, etc.		250		1,000		1,000		1,000	
Molasses		8,000		4,000		4,000		5,000	
Tallow		—		1,000		1,000		500	
Pollard and bran ..		20,000		—		—		—	
Total meals, etc. ..		65,000	7%	38,250	5%	45,000	5%	47,500	6%
Roots, fodder crops, grass									
Sugar beet		—		2,250		3,400		2,000	
Carrots		7,500		3,500		5,600		2,400	
Potatoes (pig) ..		6,000		5,000		4,000		3,500	
Artichokes		750		750		1,000		800	
Mangolds		6,000		3,000		3,000		2,000	
Swedes		28,000		27,000		30,000		20,000	
Pumpkins, etc. ..		2,000		2,500		2,500		2,000	
Chou moellier ..		250		1,000		1,000		1,000	
Grass		100,000		100,000		100,000		100,000	
Total		150,500	16%	145,000	18%	150,500	17%	133,700	15%
Total food available		964,500		806,417		875,233		884,000	
*Potential pig-meat production (tons)	8	53,825		45,150		48,850		49,325	
	6	71,750		60,225		65,125		65,775	
	5	86,100		72,250		78,150		78,925	
*Actual production ..		45,737		43,251		42,378		41,614	
*% efficiency standard, 5 food units lb. pig-meat			53%		60%		54%		53%

* See under heading "Production Potential" on page 181 for explanation.



Use of home-grown crops could be expanded. Crops to be cashed through pigs could well be included in rotations before renewing old pastures.

Trials with Nauru Rock Phosphate as Pasture Topdressing

TRIALS conducted by the Department to investigate the value of raw ground Nauru rock phosphate as a topdressing fertiliser for pastures are described in this article by K. Cottier, Instructor in Agriculture, Department of Agriculture, Wellington. The conclusions reached are summarised below.

THE first accurate trials, begun in 1921, were haying trials in which the growth on plots which had been topdressed was weighed at the hay stage to compare responses in pasture growth from various fertilisers. Plots were closed for hay production after they had been topdressed and the hay yields measured by weighing the material green immediately after it had been cut. This technique has since been superseded by other methods, but the results of a series of trials extending from 1921 to 1930 are of value, especially as many of the trials lasted for several years and were accompanied by observations on the appearance and composition of the pasture at all seasons.

Haying Trials at Te Kumi

One of the earliest haying trials was at Te Kumi, about 2 miles from Te Kuiti. This was begun in 1921 to compare the effect of ground Nauru rock phosphate with those of superphosphate and basic slag. The area selected had not been topdressed for 5 years. The land was a light loam with good drainage and carried a reasonably good sward of cocksfoot, perennial ryegrass, and dogstail, with some white clover.

The phosphates were applied annually at the rate of 3cwt. per acre from 1921 to 1924 inclusive. Half of the superphosphate and Nauru rock phosphate plots also received an initial topdressing in 1921 of 1 ton of carbonate of lime per acre. Thus a comparison was obtained between these two forms of phosphate both with and without lime.

Green hay yields were obtained in each summer after topdressing except in the 1923-24 season, when the area was grazed with dairy cows and no hay crop was taken. In addition the trial was continued for a season without topdressing and hay yields were also secured for that year. Results were:—

GREEN WEIGHTS OF HAY MATERIAL (tons per acre)

Treatment	January 1922	January 1923	1924	January 1925	January 1926	Totals
Control ..	1.2	1.1	No hay —area grazed with dairy cows	1.3	0.7	4.3
Basic slag ..	1.5	1.6		2.2	1.0	6.3
Superphosphate	2.1	2.1		2.6	1.2	8.0
Nauru phosphate	1.5	1.5		2.4	1.0	6.4
Superphosphate and lime ..	2.1	2.0		2.4	1.1	7.6
Nauru phosphate and lime ..	1.4	1.3		1.9	0.9	5.5

The figures show that phosphate responses were considerable, with superphosphate giving the best yields. Ground Nauru rock phosphate, though giving definite responses in hay yields, produced lower yields than did superphosphate, though with the progress of the trial it improved its position somewhat.

Though there was no lime response in the trial, it appeared that Nauru phosphate was rather less effective on the limed plots than on the unlimed. This effect was consistent in all the hay crops.

Just before the hay crop of 1926 the superphosphate plots were the best in appearance, with a good dense sward and bottom growth. Nauru plots were comparatively poor, with many weeds.

Haying Trials at Marton

At Marton Experimental Area several long-term haying trials were conducted at this period to compare hay-growth responses to Nauru rock phosphate and other phosphates. The soil is Wanganui silt loam and is representative of large areas of farmland in the lower parts of the North Island.

Moss's Area

In this trial ground Nauru rock phosphate was compared with superphosphate, superphosphate and lime, lime, and basic slag. Each phosphate was applied at 3cwt. per acre yearly from 1925 to 1930 inclusive, except in 1927, when there was no topdressing. Results were:—

Conclusions Drawn

EXPERIMENTS summarised in this article lead to the following conclusions:—

In most parts of New Zealand superphosphate gives better results than Nauru rock phosphate as a pasture topdressing. However, in some haying and mowing trials Nauru rock phosphate gave appreciable responses over unfertilised plots, and in most of the observational trials it gave some responses.

Two early haying trials gave no evidence that fine grinding of Nauru rock phosphate would improve its effectiveness as a pasture topdressing, but this requires further testing.

In most trials Nauru rock phosphate was considerably slower than superphosphate in causing pasture responses.

In only a few trials did Nauru rock phosphate show greater residual effect than did superphosphate, but observations for this purpose were not continued on a large number of trials when topdressing had ceased.

Trials with superphosphate - Nauru phosphate mixtures have not, on the whole, given encouraging results so far.

Mr. Farmer

Is your Tractor fitted with

C.A.V.

Fuel Injection Equipment?

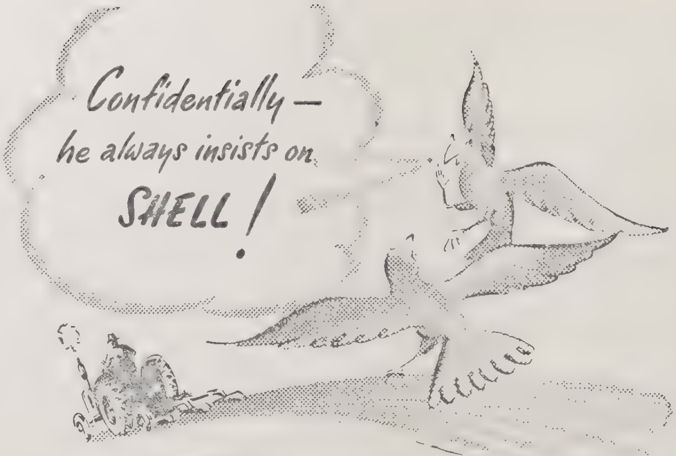
MOST BRITISH TRACTORS ARE!

Why not look and, if it is, arrange for service with your nearest appointed C.A.V. Agent, who has factory-trained Personnel.

C.A.V.

SERVICE AGENTS:

Joseph Lucas (N.Z.) Ltd.
75-77 Beach Rd., AUCKLAND.
Unity Buildings, HAMILTON.
Grey Street, TAURANGA.
Civic Buildings, WHAKATANE.
Whangarei Engineering Co.,
WHANGAREI.
L. M. Silver & Co., Ltd.,
Jervois Quay, WELLINGTON.
King Street, PALMERSTON NTH.
263 Victoria Avenue, WANGANUI.
Wooff & Salvesen Ltd.,
17-19 Lichfield St., CHRISTCHURCH.
218 Crawford Street, DUNEDIN.
Giles & Duncan, 52 Theodocia St.,
TIMARU.
Ross Mitchell Ltd., Don St.,
INVERCARGILL.


Confidentially — he always insists on SHELL!

SHELL DIESOLINE
CROSS POWER KEROSINE
SHELL MOTOR SPIRIT

Be sure-insist on

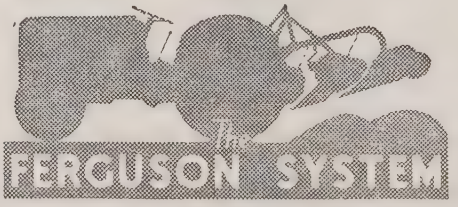
SHELL

SYMBOL OF POWER

He is a wise farmer who insists on SHELL Diesoline, CROSS Power Kerosine or SHELL Motor Spirit for his tractor. Shell tractor fuels give not only the utmost in power and economy, but a clean-burning efficiency that stretches the time between major overhauls. Yes, the shrewdest owners know 'you can be sure of SHELL!'

THE SHELL COMPANY OF NEW ZEALAND LIMITED
(Incorporated in England)

TF1.1B



FERGUSON The ONLY Tractor with these *5 exclusive advantages!*

- Traction without built-in weight.
- Penetration of implement without weight.
- Finger-tip hydraulic depth control.
- Front end kept down.
- Automatic protection of tractor and implement against hidden obstructions.

C. B. Norwood Ltd., Box 1292, Wellington.

GREEN WEIGHTS OF HAY MATERIAL (tons per acre)

Treatment (per acre)	*1925-26 and 1926-27	1927-28	1928-29	1929-30	1930-31	Totals
†Lime (1 ton)	1.7	1.6	2.3	2.2	3.2	11.0
‡Lime (½ ton) and superphosphate (3cwt.)	6.1	4.0	5.5	6.3	4.4	26.3
Superphosphate (3cwt.)	4.9	4.6	5.5	6.7	4.8	26.5
Nauru phosphate (3cwt.)	5.0	4.8	5.6	4.4	5.4	25.2
Basic slag (3cwt.) ..	5.8	4.8	6.8	4.6	4.7	26.7

* The weights given are the sum of 2 years' crops.
† Applied only in 1925 and 1929.
‡ Lime applied only in 1925.

There was a distinct hay response to superphosphate, as indicated by the comparison between superphosphate with lime and lime alone. The other phosphates, including Nauru, gave yields on the whole about equal to those of superphosphate. Nauru phosphate gave a low yield in comparison with that of superphosphate in 1929-30, but in the other years slightly outyielded superphosphate, especially in the last year in which yields were measured.

Follett's Area

Superphosphate and ground Nauru rock phosphate were compared in this trial, but a third treatment was added consisting of fine Nauru rock phosphate dust collected at the grinding works. All three forms of phosphate were applied at the rate of 3cwt. per acre each year from 1927 to 1929 inclusive with these results:—

GREEN WEIGHTS OF HAY MATERIAL (tons per acre)

Treatment	1927-28	1928-29	1929-30	1930-31	Totals
Superphosphate	5.8	8.2	10.7	12.3	37.0
Nauru phosphate	4.1	8.4	10.3	11.6	34.4
Nauru phosphate dust ..	3.7	7.1	10.4	12.2	33.4

The plots treated with Nauru phosphate showed a distinct improvement after the first year and yielded almost as well as the superphosphate plots. Superphosphate yielded the greatest total over the 4 years, but its superiority was marked only in the first year. The Nauru rock phosphate dust gave yields similar to ordinary ground Nauru rock phosphate.

Fineness of Grinding

In 1924 two trials were begun in which two grades of fineness of grinding of Nauru rock phosphate were compared. The first grade was of normal fineness and the second was somewhat more finely ground.

In the first trial the phosphates were applied only once, in June 1924 at the rate of 3cwt. per acre. Hay weights were obtained in 1924-25 and in 1925-26. In the first year the plot treated with ordinary phosphate yielded 4.7 tons of green hay material per acre, the plot treated with finely ground phosphate 4.3 tons, and the untreated control plot 3.8 tons.

Weights of material are not available for 1925-26, but both forms of Nauru phosphate had a more marked effect than in the first year. Over the 2 years ordinary phosphate gave greater yields than the more finely ground fertiliser. The trial was not continued beyond this stage.

In the second trial phosphates were applied in June 1924 at 3cwt. per acre. In May 1926 the dressings were reapplied. In the 3 years of the trial five hay cuts were secured. The plot treated with ordinary Nauru phosphate yielded a total of 38.1 tons of green material per acre, the plot treated with finely ground material 38.2 tons, and the untreated control plot 33.6 tons.

In each of these two trials the yields reflected a response to phosphate, but the special fineness of grinding had no apparent advantage.

Brice's Area

A long-term haying trial was conducted comparing various forms of phosphate. The treatments were not all strictly comparable because of differing dates of application before 1924, but from that date onward treatments were all applied at the same time.

The materials compared were superphosphate, ground Nauru rock phosphate, basic slag, and North African phosphate, which were applied in 1924, 1926, and 1929. In addition the superphosphate plots received 1 ton of carbonate of lime per acre in August 1921. Results were:—

GREEN WEIGHTS OF HAY MATERIAL (tons per acre)

Treatment (per acre)	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	Totals
Superphosphate (2cwt.)	5.8	5.5	8.5	5.3	5.2	7.4	6.3	44.0
Nauru phosphate (4cwt.)	4.1	4.1	5.9	6.5	8.6	7.3	7.9	44.4
Basic slag (4cwt.)	4.3	2.2	6.2	5.1	4.5	5.5	6.4	34.2
North African phosphate (4cwt.)	3.8	2.1	4.5	7.9	7.2	5.8	7.0	38.3

The figures show that 2cwt. per acre of superphosphate had a quicker though shorter-lived effect than 4cwt. per acre of Nauru phosphate. The yield responses to superphosphate are well marked in the hay crops in the summers following the topdressings, with correspondingly well-defined depressions in the years of no topdressing. There are no such trends in the plots treated with Nauru phosphate, where successive yields show a steady, almost regular increase. The North African phosphate also showed this trend, though to a less extent.

The total hay weights over the seven crops weighed are practically equal from the superphosphate and Nauru phosphate plots. On a basis of phosphate content superphosphate was applied at less than half the rate of ground Nauru rock phosphate.

Haying Trials at Alfredton

A haying trial was begun at Alfredton, in the Wairarapa district, in 1921. It was conducted on browntop pasture in an attempt to encourage the better grasses and clovers by topdressing. The soil was described as a white papa clay, rather impervious to drainage. Soil tests indicated that the lime requirement of the area was about 2½ tons of carbonate of lime per acre.

Superphosphate, Nauru rock phosphate, and North African phosphate were each applied at 2cwt. per acre. In addition half of each plot was topdressed with carbonate of lime at 1 ton per acre. Though no subsequent topdressing was applied, hay weights were obtained for 2 years, with the following results:—

GREEN WEIGHTS OF HAY MATERIAL (tons per acre)

Treatment	1921-22	1922-23	Totals
Control	2.2	5.8	8.0
Superphosphate	7.0	10.0	17.0
Nauru phosphate	5.5	8.8	14.3
North African phosphate	3.0	7.9	10.9
Superphosphate and lime	8.0	13.0	21.0
Nauru phosphate and lime	6.0	6.7	12.7
North African phosphate and lime	4.0	5.7	9.7

Yields showed a marked response to phosphate in the first crop after topdressing, with superphosphate outstanding but Nauru phosphate also giving a large increase. The addition of lime was beneficial. In the second year, though no further topdressings were applied, responses continued to show in hay weights, with superphosphate giving best results. The addition of lime was of decided benefit with superphosphate, but had a depressing effect with Nauru and North African phosphates.

Mowing Trials

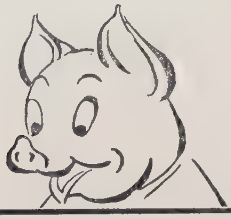
Since 1930 newer techniques for measuring pasture production by mowing trials have been used, enabling measurement at all seasons in conditions resembling those of grazing pasture. Two such trials involving the use of Nauru rock phosphate have been conducted at Marton Experimental Area.

A mowing trial was begun in 1939 to compare the pasture production from plots topdressed with different forms of phosphates, including superphosphate and ground Nauru rock phosphate. The phosphates were applied annually at the rate of 4cwt. per acre from 1939 to 1944 inclusive. The Nauru phosphate was a well-ground product of which 95 per cent. passed through a 100-mesh sieve. No lime was applied. The annual pasture production figures were:—

SPEEDWAY
LOW & HIGH PRESSURE
OIL BURNING
BOILERS

Write for free illustrated catalogue to **Speedway Products Ltd.**, 26 Albert St., Auckland. South Island Distributor: A. H. Turnbull & Co. Ltd., Christchurch.

SB-1-2



for quickest gains feed

TOMOANA PIG CONCENTRATE

DESOUTTER

Electric and Pneumatic

PORTABLE POWER TOOLS

Additions to the range are the

TWO SPEED $\frac{1}{2}$in. ELECTRIC DRILL

TWO SPEED $\frac{5}{8}$in. ELECTRIC DRILL

FEATURES: **High and Low Speed — over .35 h.p.**
Weight approx. 10lb.

N.Z. Agents

de PELICHET, McLEOD & CO. LTD.

P.O. BOX 205 - - - - - - - - - - - - - HASTINGS

Supplied in 3/8" and 1/2" sizes of 2 braid construction for a working pressure of 300 lbs. per sq. inch and 3 braid construction for 500 lbs. working pressure.

Made in lengths of 500 ft.

Also supplied in wrapped ply type.

DUNLOP
BRAIDED SPRAY HOSE
HORTICULTURAL
HOSE

The modern high pressure power pump spray entails the use of a hose of exceptionally high quality and strength and Dunlop spray hose has been specially designed for this service. The rubber compounds used in the hose have been developed to meet the special conditions, the lining rubber being highly resistant to the chemical solutions used in spraying, whilst the cover is made to withstand the wear and tear of dragging over rough surfaces.

DUNLOP

DUNLOP NEW ZEALAND LIMITED

DH.1.9

Part of the phosphate deposits on Nauru Island from which the material used in the trials described in this article was drawn.

GREEN HERBAGE PRODUCTION (lb. per acre)

Year	Control	Superphosphate	Nauru phosphate
1939-40	31,587	+5,070	+2,920
1940-41	45,575	+7,616	+4,356
1941-42	68,857	+7,103	+6,634
1942-43	39,446	+6,141	+5,578
1943-44	33,523	+6,516	+5,445
1944-45	58,927	+12,451	+10,866
Totals	277,915	+44,897	+35,799
Relative production of dry matter for total period	100	116	113

Both fertilisers gave greater pasture production than the control, but superphosphate gave a greater increase than Nauru phosphate, though in some years its superiority was not marked. From the statistical analysis of the trial this superiority of superphosphate is statistically significant in 1940-41 and also in the total over the 6 years of the trial.

It may be concluded from the result of this trial that ground Nauru rock phosphate gave almost as high production as did superphosphate when both were applied annually for 6 years at the rate of 4cwt. per acre.

At Marton Experimental Area a mowing trial was begun in 1940 to compare pasture production from treatments of superphosphate, serpentine superphosphate, and a hot mix of 3 parts of superphosphate and 1 part of ground Nauru rock phosphate. The phosphates were applied at the rate of 4cwt. per acre annually from 1940 to 1945 inclusive. Pasture production yields were:—

GREEN HERBAGE PRODUCTION (lb. per acre)

Year	Superphosphate	Serpentine superphosphate	Superphosphate and Nauru phosphate
1940-41	58,212	—852	—6,492
1941-42	86,664	—156	—4,428
1942-43	45,060	—432	—1,932
1943-44	47,268	—1,296	—1,968
1944-45	64,596	—120	—5,436
Totals	301,800	—2,856	—20,256
Relative production of dry matter for total period ..	100	98	92

Observational Trials

In 1940 a series of observational topdressing trials was begun to compare superphosphate with ground Nauru rock phosphate and 3 : 1 hot mix of superphosphate and ground Nauru rock phosphate. The plots received annual topdressings of phosphate at the rate of 3cwt. per acre. In addition carbonate of lime was applied to half of each plot at the rate of 1 ton per acre initially and 5cwt. per acre annually thereafter, so that the phosphates were compared in both the presence and the absence of lime. The Nauru rock phosphate was a well-ground material of which 95 per cent. passed through a 100-mesh sieve.

The effects of the fertilisers were judged by allotting marks according to visual responses in comparison with unfertilised control plots, the following scale of points being used: 0, no difference from no manure; 1, slight difference; 2, fair difference; 3, good difference; 4, very good difference; and 5, excellent difference. The trials were continued throughout New Zealand for several years and most of the plots received at least three annual topdressings of fertiliser.

On visual evidence superphosphate was generally judged superior to both Nauru phosphate and the superphosphate-Nauru phosphate mix. The mix tended to be intermediate between superphosphate and Nauru phosphate.

PERCENTAGE OF TRIALS IN WHICH SUPERPHOSPHATE WAS SUPERIOR BY AT LEAST 1 POINT

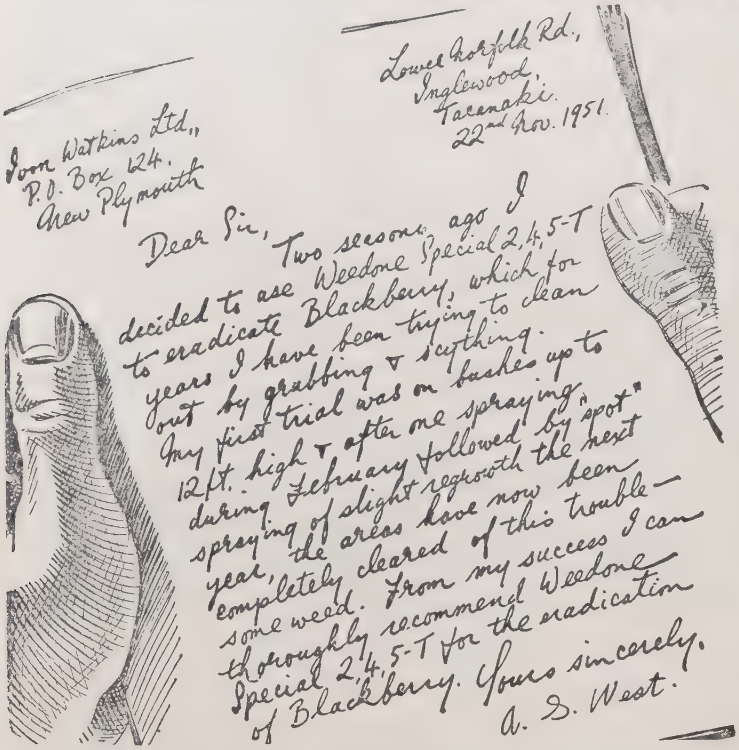
	On unlimed ground	On limed ground
Compared with ground Nauru rock phosphate	69	76
Compared with superphosphate-Nauru phosphate mix	25	36

RELATIVE MAGNITUDES OF RESPONSES (per cent.)

	Fertiliser	Nil	Slight	Fair	Good to excellent
On unlimed ground	Superphosphate	—	20	42	38
	Nauru phosphate	6	80	13	1
	Mix	2	31	55	12
On limed ground	Superphosphate	—	3	33	64
	Nauru phosphate	5	57	26	12
	Mix	—	13	47	40

TARANAKI FARMER KILLS Blackberry

IN ONE SPRAYING



Lower Norfolk Rd.,
Inglewood,
Taranaki.
22nd Nov. 1951.

Ivon Watkins Ltd.,
P.O. Box 124.
New Plymouth

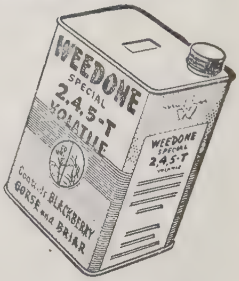
Dear Sir,

Two seasons ago I decided to use Weedone Special 2,4,5-T to eradicate Blackberry, which for years I have been trying to clean out by grabbing & scything. My first trial was on bushes up to 12ft. high & after one spraying during February followed by "spot" spraying of slight regrowth the next year, the areas have now been completely cleared of this trouble-some weed. From my success I can thoroughly recommend Weedone Special 2,4,5-T for the eradication of Blackberry. Yours sincerely.

A. S. West.

Your Weedone Service Distributor or Co-Distributor has red-labelled Weedone Special 2,4,5-T together with full instructions on its use.

Look for THIS Label



wipe-out Blackberry with

WEEDONE SPECIAL 2,4,5-T

Weedone Special 2,4,5-T is a product of Ivon Watkins Ltd., P.O. Box 124, New Plymouth and Ivon Watkins (Aust.) Pty. Ltd.,

IW. 53

ALL THE ANSWERS ON

SILAGE MAKING

Absolutely New! Topical! Fully Illustrated! Learn an easier way of making silage from the cutting of the crop to the feeding-out to cattle and sheep. Make certain of mechanising your silage-making next season. We regret past shortages and late arrival of Paterson Buckrakes this season due to factors beyond our control, but supplies are now available, and early ordering for next season is important.

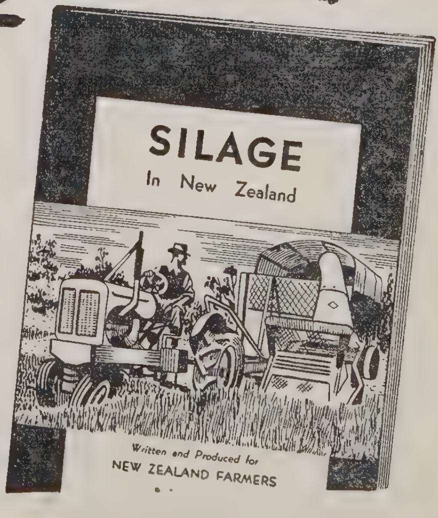
Send Your Name and Address with 2/- in Postal Notes to our Nearest Branch or Agent.

ANDREWS & BEAVEN LTD.

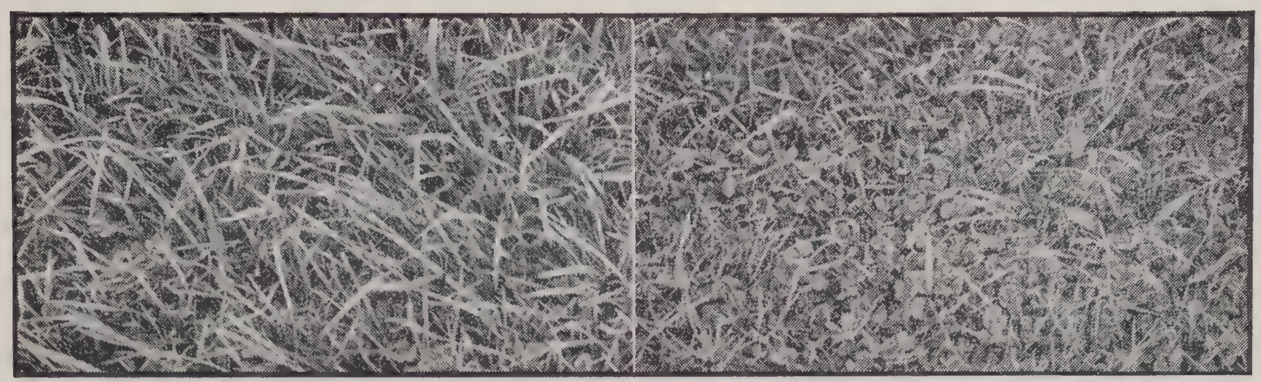
HEAD OFFICE: Moorhouse Avenue, Christchurch. BRANCHES: Auckland, P.O. Box 2528—Wellington, P.O. Box 1868—Ashburton, P.O. Box 17—Timaru, P.O. Box 145—Invercargill, P.O. Box 5.

SOUTH ISLAND AGENTS: Nelson: Levin & Co. Ltd. Blenheim: W. G. G. Cuddon Ltd. Oamaru: Ernest Reid & Co. Ltd. Dunedin: Donald Reid & Co. Ltd. Greymouth: West Coast Agencies Ltd.

NORTH ISLAND AGENTS: Whangarei: James & Whimp Ltd. Auckland: Auckland Farmers' Union Co-operative Society Ltd. Hamilton: Newton King Ltd. Tauranga: D. S. Mitchell Ltd. Te Puke: Bayliss & Booth Ltd. Whakatane: Dave Wilson (Whakatane) Ltd. Gisborne: H. S. Motors Ltd. Hastings: Bull and Hodgins Ltd. Palmerston North: Manawatu Machinery Exchange Co. Ltd. New Plymouth: Newton King Ltd. Wanganui: Wanganui Machinery Exchange Ltd. Carterton: Masson Implement Co. Ltd.



- The Deed of Letters Patent on Patersons Buckrake No. 100406 has now been issued. Appropriate action will be taken against infringement. Manufacturers in New Zealand of Buckrakes are warned accordingly.



A very good manurial response shown by marked stimulation of clovers in the improved pasture on the right.

Cumulative Effects

In plots which received regular annual topdressings over the duration of the observational trials only a small percentage showed that ground Nauru rock phosphate gained relatively on superphosphate as time passed, and the superphosphate-Nauru phosphate hot mix tended to become progressively less effective than superphosphate on the limed plots.

RELATIVE POSITIONS EARLY AND AT FINAL STAGES OF TRIALS

CATEGORY	PERCENTAGES OF TOTAL TRIALS			
	Ground Nauru rock phosphate		Superphosphate-Nauru phosphate mix	
	Unlimed	Limed	Unlimed	Limed
Definitely improved in relation to superphosphate	16	18	7	8
No change	80	76	90	75
Definitely deteriorated in relation to superphosphate	4	6	3	16

In the "definitely improved" category in only one instance was Nauru phosphate better than superphosphate; that was on unlimed ground. The superphosphate-Nauru phosphate mix was better than superphosphate on only six occasions—four times on unlimed ground and twice on limed ground.

Residual Effects

In some of the trials observations were continued for several years after topdressing had ceased.

Surprisingly good responses were maintained in the two trials on which observations were continued for 4 years. In one (at Paemako, Waitomo County) both superphosphate and superphosphate-Nauru phosphate mix were showing good responses and the Nauru phosphate response was inferior on both limed and unlimed plots. In a trial at Ahuroa, on gumland soil, the phosphates were showing equal responses, slight in the absence of lime and fair on the limed plots.

Four trials were continued for 3 years after topdressing had ceased. In a trial at Mairoa at the final inspection Nauru phosphate was still showing a slight to fair response, not affected by presence or absence of lime; this was the only fertiliser effect showing. In a trial in the Matapiro (Hawkes Bay) district, though no difference was apparent between the phosphates on unlimed plots, in the presence of lime both superphosphate and superphosphate-Nauru phosphate mix gave better responses than Nauru phosphate. In the trials at Warkworth and New Plymouth all the phosphates gave fair to good responses, especially on the limed plots, and there were no definite differences.

Five trials were continued for 2 years after the final topdressing. At Waihi on medium to light volcanic loam superphosphate, though showing fair response, was inferior to both Nauru phosphate and superphosphate-Nauru phosphate mix, rather more markedly in the absence of lime. On a semi-podzolised light pumice in the Waihi district all the phosphates were giving fair responses on both limed and unlimed plots, with no definite differences. At Tuakau there were only slight responses to the phosphates without lime, but on limed plots Nauru phosphate, though showing a fair to good response, was inferior to the other phosphates, which showed good to very good responses. At Waitawheta (Ohinemuri County) superphosphate was still giving a good response much superior to that of either Nauru phosphate or superphosphate-Nauru phosphate mix, this result being unaffected by presence or absence of lime. At Hawera superphosphate and Nauru phosphate gave equal, slight responses, both with and without lime; superphosphate-Nauru phosphate mix was not assessed.

RESIDUAL EFFECTS OF FERTILISERS

Length of time after last topdressing	Locality	No lime			Lime		
		Superphosphate	Superphosphate-Nauru phosphate mix	Nauru phosphate	Superphosphate	Superphosphate-Nauru phosphate mix	Nauru phosphate
4 years	Paemako	2½	2½	½	3½	3	1½
	Ahuroa	1½	1	1	2	2½	2
3 years	Mairoa	0	0	1½	0	0	1½
	Warkworth	1½	2	1½	2	2½	2
	New Plymouth	2	2	1½	3	3	2½
	Matapiro	½	½	½	2	1½	½
2 years	Waihi (medium to light volcanic loam)	1½	3	3	2	3	3½
	Waihi (semi-podzolised light pumice)	1½	2	1½	2½	2	2
	Waitawheta	3	1	1	3	1	1
	Tuakau	1	1	1	4	3½	2½
	Hawera	1	—	1	1	—	1

In these trials ground Nauru rock phosphate showed no general superiority in residual effect over superphosphate or superphosphate-Nauru phosphate hot mix.

Further Investigations

The trial evidence summarised on page 183 is by no means complete, and extensive work is now being undertaken to investigate the effect of such aspects as greater fineness of grinding of Nauru rock phosphate, heavy initial dressings of Nauru phosphate, incorporating Nauru phosphate in the soil compared with applying it to the surface, and mixtures of superphosphate and Nauru rock phosphate in varying proportions. A more comprehensive survey will be made of the effects of Nauru rock phosphate on various soil types.

Care of Livestock during April

Contributed by the Animal Research Division

CARE OF CALVES

THE best way to prevent calves dying during winter is to treat them properly during autumn. They should never spend more than 2 or 3 days in one paddock, and should be rotated ahead of the cows through the best paddocks available. Good-quality hay should be provided for them daily, especially when the feed is growing fast after autumn rains. At the first sign of scouring they should be drenched with phenothiazine.

DRYING OFF DAIRY COWS

A dairy cow requires a reasonable spell between lactations, and should be dried off at least 6 weeks before she is due to calve. This should be done even if she is still milking heavily. The drying-off process need not be prolonged: it is quite safe just to stop milking, provided any quarters affected with mastitis are treated with the usual course of 3 tubes of penicillin, the last tube being given after the cow is milked for the last time.

AUTUMN-SAVED PASTURE

Early-calving cows are nearly always short of feed during July and August, and often during September. In most seasons pasture is not growing fast enough during these months to meet the requirements of milking cows. Crops are expensive to grow and concentrates are even more expensive to buy. It costs nothing, however, to shut up pasture in the middle of April and let it grow for use in early spring. About a sixth of the dairy area should be shut up in this way. Advice regarding the best paddocks to spell and the best method of feeding the autumn-saved pasture by the use of electric fences can be obtained from local officers of the Department of Agriculture.

CARE OF EWES

If rams remain with the ewes for more than 4 weeks, they should be raddled on the brisket so that the late lambing ewes can be drafted off. Once the ewes are in lamb the level of feeding should be lowered to prevent their becoming too fat. By increasing the rate of stocking during autumn some paddocks can be shut up and pasture allowed to grow for grazing during the 3 weeks before lambing. These measures will greatly assist in reducing "sleepy sickness", which is most prevalent in fat ewes which are inadequately fed just before lambing.

CARE OF LAMBS

If the summer and autumn have been wet, lambs are likely to be suffering from worms. Drenching with phenothiazine 2 or 3 times at 3-weekly intervals will help. This applies particularly to the tail of the flock, which should be drafted off for special attention. Feed, however, is the most important consideration. During autumn lambs do best if grazed on pastures which have been allowed to grow to a height of about 6in. Hay aftermath and red clover are both very good. If these are not available, the lambs should be distributed thinly over the dairy paddocks or on hill pastures. They should on no account be concentrated in large numbers on short, rapidly growing pastures, especially if these have previously been grazed by ewes and lambs.

RED WORMS IN HORSES

Red worms can seriously reduce the efficiency of working horses, and are responsible for many deaths in foals. Phenothiazine is a very effective remedy, but is best given under veterinary supervision, as, in certain conditions, it may prove dangerous. Treatment should be administered before winter.

DECEMBER-FARROWED PIGS

Litters farrowed in December should be sold as pork. If they are carried on to bacon weights, no milk will be available for the later litters, which will have to be sold cheaply as stores or wintered on expensive concentrates. Available root crops may be fed to sows, but they require supplementing with milk or meat meal.

TUBERCULOSIS IN POULTRY

Tuberculosis not only causes considerable loss in poultry, but it frequently spreads to pigs, with consequent condemnations at the meat works. If this disease is suspected, veterinary aid should be sought with a view to eliminating affected birds.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during January and for the 6 months ended 31 January 1952 with comparative figures for the same month and 6-monthly period of 1951, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Tons Creamery	Tons Whey	Tons Total	% Inc. or dec.	Total tons in store at end of mth.
January 1952 ..	21,888	353	22,241	—	33,842
January 1951 ..	23,952	465	24,417	—	47,766
Inc. or dec. ..	—2,064	—112	—2,176	—8.911	—13,924
For 6 mths. to 31/1/52 ..	111,619	1,815	113,434	—	—
For 6 mths. to 31/1/51 ..	107,941	2,001	109,942	—	—
Inc. or dec. ..	+3,678	—186	+3,492	+3.176	—

CHEESE

Period	Tons White	Tons Coloured	Tons Total	% Inc. or dec.	Total tons in store at end of mth.
January 1952 ..	12,834	203	13,037	—	20,631
January 1951 ..	15,545	184	15,729	—	24,596
Inc. or dec. ..	—2,711	+19	—2,692	—17.114	—3,965
For 6 mths. to 31/1/52 ..	59,023	519	59,542	—	—
For 6 mths. to 31/1/51 ..	65,051	1,513	66,564	—	—
Inc. or dec. ..	—6,028	—994	—7,022	—10.549	—

If these figures are converted into butterfat equivalent, there is an increase of 0.269 per cent. in butterfat graded for the 6 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Preparations for Cereal Crops: Drainage by Pumping

Seasonal Notes by the Extension Division

EVERY ENDEAVOUR should be made for New Zealand to attain as great a degree as possible of self-sufficiency in cereal production. Preparations in the South Island for autumn and winter sowings of oats and wheat should be pushed ahead as rapidly as weather and soil conditions allow.

* * *

OAT PRODUCTION THE development of mechanisation and the consequent reduction in the number of working horses has reduced greatly the acreage of oats sown. During the period 1935-39 the average area of oats in the Dominion was 316,636 acres, but for the 1946-49 period the average had dropped to 183,924 acres. This crop is, however, still of considerable importance, not only for feeding of stock, but also for human consumption, for which about 800,000 bushels of oats are required annually. The most important area for oats is Canterbury, about 60 per cent. of the oats for threshing being grown in this land district. Southland grows over 20 per cent. and Otago about 15 per cent. White oats are the most acceptable to millers. Abundance and Onward varieties, which may be autumn or spring sown, constitute the great proportion of the acreage of this type, but other white varieties include Royal Scot, Russet, Spitfire, Achilles, and Binder. Algerian and Dun oats, which are classified as grey oats, are popular in Canterbury, where they are autumn sown (February or March) for greenfeed and the crop is either cut for chaff or harvested for grain in the following summer. Newly harvested Algerians do not germinate satisfactorily and cannot be used for sowing in the autumn immediately following harvesting. Black Supreme may be sown either in the autumn or spring and the straw is fairly long.

CULTIVATION Oats may be grown on almost any class of land, but for best results a free working soil of medium fertility is required. The crop may be grown almost anywhere in the crop rotation, either out of lea or following turnips; on high-fertility land it may successfully follow wheat and may be either spring sown or autumn sown. Lea land intended for oats should be ploughed early and thoroughly worked to a firm seed-bed. It is not necessary to work land too fine, especially for autumn sowing, when in fact it is better to have the land rubbly on top. Oats in Southland usually follow turnips; ploughing is then not always essential. The ridges may be thoroughly disced and harrowed to produce a good seed-bed.

SEED AND FERTILISERS Sowing rates vary considerably. The rate for autumn-sown varieties is 2 to 2½ bushels per acre, and for spring sowing this is increased to 3 bushels per acre in Canterbury and 4 bushels in Southland. On high-fertility land, particularly in Southland, where oats generally follow swedes, there is always the hazard of lodging of this crop, and heavier rates of seeding up to 5 bushels are sometimes made to reduce the risk to some extent, but this is by no means a guarantee against lodging. On high-fertility land no fertiliser should be used, as this will increase the risk of lodging. On lower-fertility land the crop will respond to phosphatic fertiliser, either "super. compound" or reverted phosphate at 1½cwt. per acre drilled in with the seed. Phosphate tends to hasten the maturity of the crop, thus permitting earlier harvesting.

—*W. FAITHFUL*

* * *

SEED-BED FOR WHEAT THE seed-bed for wheat should be fairly fine underneath and cloddy on top so that it will withstand winter conditions. Where wheat follows grass, summer skimming and autumn working should precede the final deep ploughing. After rape, linseed, or linen flax ploughing, grubbing, and harrowing are usually sufficient to produce a suitable seed-bed. After potatoes deep ploughing and one stroke of the harrows is usually sufficient.

WHEAT VARIETIES Cross 7 with its valuable baking and heading qualities is the most important wheat variety and for several seasons has occupied about 75 per cent. of the area sown. Similarly Fife Tuscan has occupied about 12 per cent. of the wheat area and is chiefly grown on the lighter wheat lands in the drier districts; it is a slightly better yielder with a lower baking quality than Cross 7, but has weaker straw and is more prone to lodging. Dreadnought represents about 5 per cent. of the wheat area and is a suitable variety for the richest wheat lands in the drier districts and under these conditions will outyield any of the other varieties mentioned. Its tall, weak straw makes it subject to lodging and straw break. There is an increasing tendency to harvest this variety by cutting and windrowing with the binder and threshing with a pick-up attachment on the header. Solid Straw Tuscan, which at its peak years ago used to represent about 75 per cent. to 80 per cent. of the wheat area, has now dropped to about 4 per cent. It is now confined to the lighter wheat lands of Canterbury. The recently developed variety Yielder has proved a higher producer than Cross 7 and over all trials to date has given an increase of 4 bushels per acre. It is taller than Cross 7 and more subject to lodging. Hilgendorf, another new variety, has outstanding baking qualities. It is on the average a slightly lower yielder than Cross 7 except in fairly restricted areas, which appear to suit the variety.

FERTILISERS FOR WHEAT Early fertiliser trials with wheat showed that the average increase from the use of 1cwt. of superphosphate was about 5 bushels per acre. In recent years the increases have been less, due probably to increase in soil fertility brought about by better pasture management. Good responses to superphosphate are, however, still obtained on the lighter wheat soils and on land which has not previously carried good pasture.

—*L. W. BLACKMORE*

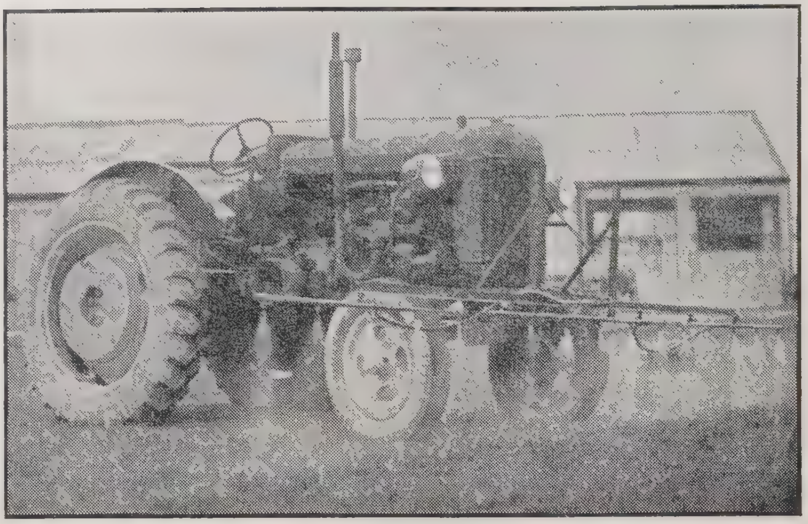
* * *

DRAINAGE BY PUMPING ON wet, flat areas close to sea or lake level adequate outlets for field drainage are difficult to obtain and pumping has usually to be resorted to. A ponding area in the form of open ditches around and through the area can be formed because the land has little or no fall in it. These open ditches must be spaced at such distances that they lower the water-table of the area so that pastures and crops thrive. It has been found in the Whakatane and Wairarapa areas that the pump or pumps need to have a capacity of 1000 gallons per acre per hour, so that they can rid the area of an inch of rain in 24 hours by continuous pumping. Under normal conditions the pumps work once or twice a day for short periods. Because pumps control the height of the water-table, sub-irrigation can be practised in time of drought by judicious pumping. It is usual to install two pumps whose total capacity meets the above requirements and have one cut out once the water drops below a predetermined level. Before the pump-house and ponding area are designed the "seepage gradient" for the particular soil type must be determined. The services of an engineer familiar with similar conditions should be co-opted to take levels, design the pump-house and ponding area, and advise on the brand of pump to buy.

—*K. L. MAYO*

Control of Weeds in Grass Seed Crops by Hormone Sprays

METHODS of applying hormone sprays for the control of weeds in grass seed crops in Hawkes Bay are described in this article by R. P. Hill, Fields Instructor, Department of Agriculture, Hastings. Any of these methods is suitable for weed control in grass seed crops and will not cause injury either to the crop or to the seed harvested, but they are not recommended for clover seed crops. Because of the risk of damaging viability of the seed produced sprayings should not be delayed until after October.



Typical low-volume spraying equipment mounted on a tractor.

UNQUESTIONABLY the best method of weed control is by fallow and summer cultivation, which not only helps to eradicate weeds but is of inestimable benefit to the soil. Unfortunately in Hawkes Bay this is not common and the usual practice in grass seed production is to take the land out of crop or pasture and sow it immediately with perennial ryegrass for seed production. Naturally weeds are aggressive under these conditions, the principal ones affecting grass seed crops being hedge mustard, Scotch thistle, buttercup, burr clover, shepherd's purse, speedwell, amaranthus, and fat-hen, all of which are easily controlled by hormone sprays in their young stage. It is customary for low-volume sprays to be used; few farmers resort to the old high-volume method, with its water transport difficulties.

The first method adopted in the district and still in common use was the application of the hormone weed-killer about a week after stock had been removed at the end of October and when the paddock had been grazed bare preparatory to closing the area for grass seed. If a week is allowed to pass before spraying, the weeds have time to "lift" and are easily sprayed. The quantities of commercial preparations of 2, 4-D used are 1 to 1½ pints of the oil-based ester or the amine salt diluted with 6 to 10 gallons of water per acre. These products contain 3.6 or 4lb. of acid equivalent per gallon.

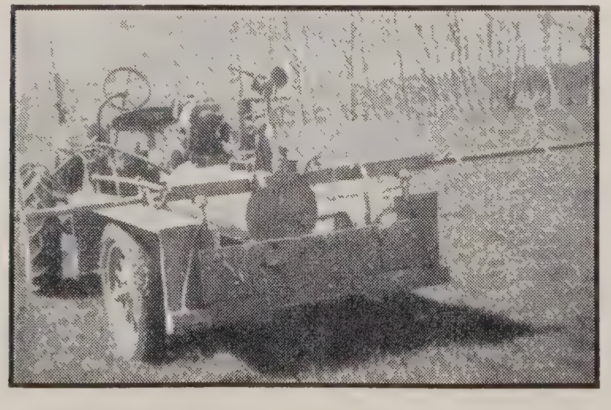
Each of the formulations of 2, 4-D has its specialised use in pasture spraying. Under conditions most suitable for plant growth the cheapest formulation of 2, 4-D (sodium salt) will control susceptible weed species in pastures at low rates of application; heavier rates of application of the sodium salt or the amine salt should be used under adverse spraying conditions, that is, cold soil and atmospheric conditions unsuitable for plant growth.

The amine salt and sodium salt are water soluble and therefore best results are secured when dry weather follows application. Heavy rain tends to wash the water-soluble sprays off the plant foliage. The oil-based esters should be used only when weather conditions, for example, rain after application, would adversely affect the water-soluble sprays.

The use of the sodium salt also reduces the damage to clovers, especially red clover, which are susceptible to the oil-based ester and to a less degree to the water-based amine salt.

A second method is to graze hard up to the first week in October, remove the stock, then spray, and a week or 10 days later place the stock back on the area, when they will graze off all the wilted weeds as well as the grass. They should remain on the area until the normal closing-up time, about the end of October.

The third and probably the most efficient method is to remove the stock for a short time in early spring (at the end of August or early in September) and then to spray, only half the quantity of hormone, as low as ½ pint to ¾ pint to 6 to 10 gallons of water, being used. When the weeds are very young it takes very little to kill them; small docks are susceptible in the early stage. It may be necessary, depending on the season, to give a second spraying, but this is rarely necessary, except perhaps when fat-hen and amaranthus show up later.



A Hawkes Bay farmer's low-volume spraying unit that is mounted on a trailer pulled by a small tractor.

As spraying takes place early in the season, fat-hen or amaranthus, if present, are in the very young stage and are readily killed.

Some farmers have mixed hormone dusts with fertiliser and topdressed their paddocks in spring. Though this method has been effective, it has been more expensive.

Hormone spraying has now been done for several years. It has produced much cleaner crops and has had no detrimental effect on the germination of the seed harvested. If applied late, it has had a retarding effect on white clover growth, which has quickly recovered, but it has completely controlled burr clover, one of the greatest hindrances in the production of ryegrass crops in moister areas.

Many farmers now have their own spraying equipment. One uses a small tractor for haulage, a 1 h.p. engine on a trailer, a pump, and a 27-gallon tank, and with a 30lb. pressure and a boom with low-volume nozzles mounted on the back of the trailer he is able to cover up to 80 acres per day, travelling at 7 miles per hour. His weeds are principally Scotch thistle. He always sprays early in the season, using from 5 to 8 fl. oz. of 2, 4-D solution (4lb. of acid equivalent per gallon) with 1½ gallons of water per acre. The cost of spraying, excluding wages for himself, is about 7s. per acre, depending on the type of hormone he is using. To save time he has an independent pump mounted on the back of the tractor. This pump is driven by the power take-off and is used to fill the spray tank.

This farmer endeavours to spray on an overcast day, as he is convinced that the lethal effect is better when the sun's rays do not dry the spray off the plants quickly.

HARVESTING MATURITY OF STONE FRUIT

THE degree of maturity of stone fruit at the time of harvesting has an important influence on the transport potentialities of the fruit and its subsequent marketing value. The ability, therefore, to recognise the correct stage of maturity for particular purposes is a valuable attribute of any person connected with the actual work of harvesting. There has been evidence in recent years that much better decisions as to the stage of maturity at which fruit is harvested could be made, particularly to avoid the marketing of immature fruit, and T. Conway, Orchard Instructor, Department of Agriculture, Hastings, not only emphasises in this article the need for an improvement, but also indicates how best this can be achieved.

THE stone-fruit industry has shown considerable expansion over recent years and large numbers of young trees now planted will shortly come into production. With this increased production it is vital to the industry to ensure that the fruit not only arrives on the markets in the best possible condition, but that the quality of it will encourage increased consumption.

As stone fruit is a very perishable product, there is an inclination at times to harvest the fruit when it is somewhat immature to make sure that it arrives on the market in sound condition. The result is that size and quality are often sacrificed, and the fruit is unlikely to be attractive to the consumer. The remedy appears to be better handling and transport rather than early or immature picking.

In recent years many growers and merchants have installed small pre-cooling and holding stores for these highly perishable fruits, and the Horticulture Division and the Railways Department are co-operating in trials with a view to improving transport conditions for pre-cooled stone and small fruits.

With growers of the earlier varieties of fruit there is a desire to be the first on the market while the prices are high; good maturity, size, and quality being given little consideration. Would those who make a practice of this buy such fruit in the retail shops or elsewhere, and would they go back for more? It should be remembered that the satisfied buyer is of utmost importance to growers.

Marketing of immature fruit becomes a short-sighted policy when the encouragement of increased consumption and repeat orders is so vital to the future of the industry.

Guiding Factors

If fruit is picked too soon, the quality suffers and the fruit is unattractive on the market and to the consumer. On the other hand fruit left on the trees too long tends also to lose its quality; it becomes soft, and damages easily from pressure and handling in transit to the markets. An intermediate stage of maturity should therefore be the aim. In this respect no set dates can be indicated or adhered to for specific varieties, as the correct period varies each season, depending on prevailing conditions.

All fruit on a tree does not mature at the same time and therefore the work of picking becomes essentially a very selective process requiring good judgment. Frequent or successive pickings of any one variety are necessary, particularly during periods of warm or hot weather. Some varieties mature more unevenly than others and so require more frequent attention and greater judgment to obtain the best results.

In selecting the fruit for picking it is advisable that it should be fully developed but still firm. "Firm" in this case does not mean hard and green but that the fruit still retains a stage of immaturity, requiring completement of the ripening process after picking. The fine distinction of both maturity and firmness must be appreciated.

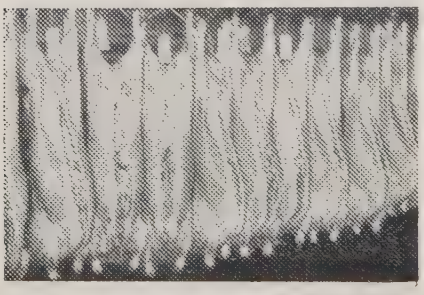
The proximity of an orchard to the markets is often a deciding factor in determining how mature the fruit should be at harvesting time. Where it is necessary to transport fruit long distances it needs to be firm, but should also show some colour and change in flesh texture typical of the variety. Where markets are closer more latitude will be possible in respect to maturity, with more colour

HEADING PHOTOGRAPH: Peaches being carefully selected on a maturity basis and well handled.

DOUBLE TRIUMPH
for

ELASTRATOR
CASTRATION AND TAILING

at the Marlborough A. & P. Association, Picton.



1st PRIZE on the hoof

. . . to Mr. M. D. Campbell, Marlborough, enthusiastic Elastrator user for 4 seasons. He finds Elastrator rubber ring method easy, clean, safe . . . has operated on more than 1,200 lambs and lost only ONE. Says Elastrator gives first-class results . . . proves it with champion stock.

1st PRIZE on the hooks

. . . to Mr. T. P. Murphy of Spring Creek, another consistent Elastrator user who acclaims the advantages of this bloodless method of castration and tailing . . . and who shares in Elastrator's Double triumph.

Follow their lead. Next season, for better stock, use the

ELASTRATOR

Bloodless Rubber Ring Method of Castration and Tailing

Elastrator Co. Ltd., Box 266, Blenheim.

SHEEP BLOWFLY CONTROL NEW METHODS

Cooper scientists, after many years' research with the two most outstanding fly insecticides, D.D.T. and "Gammexane", have produced preparations for both TREATMENT and PREVENTION of strike. Thus, at last, practical methods are at hand for dealing with a pest that is responsible for such great economic loss.

PREVENTION

COOPER'S POWDER FLY SPRAY and DIP

(Containing D.D.T. and "Gammexane")

A new and highly effective powder preparation providing 5-6 weeks' protection from strike with one spraying. It should be used at the onset of a fly wave or better still, systematic sprayings undertaken each year at a time immediately prior to the date at which fly is normally expected. Five 2lb. packets make 100 gallons of spray which should be sufficient for upwards of 400 sheep. Bucket pumps or power units can be used.

TREATMENT

COOPER'S MAGGOT DRESSING

(Also containing D.D.T. & "Gammexane")

An entirely new type of product for treatment of struck sheep. This dressing has advantages not possessed by any other, the chief being that *it expels maggots from the fleece instead of leaving putrefying bodies to attract further flies.* Moreover Cooper's Maggot Dressing protects the wound against re-strike and assists healing. Does not irritate the skin or stain the fleece. (1 part Dressing to 19 parts water.) Gallon drums and 16oz. tins.

ORDER FROM YOUR STOCK AND STATION AGENT OR MERCHANT

COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD.
BOX 599 - - - - - AUCKLAND

The Shortage of PHOSPHATIC FERTILISERS

New Zealand is short of phosphatic fertilisers and there is little prospect of an improvement in the supply. Therefore you should place your order now for BASIC SLAG which will be arriving according to shipping space available during the current season.

BASIC SLAG is a valuable source of quickly available phosphate for grasslands. Pastures must be topdressed to keep up production. Do not neglect this important work.

BELGIAN BASIC SLAG
SYBESCO

BASIC SLAG IS PARTICULARLY RECOMMENDED FOR USE BY ALL FARMERS IN THE HIGH RAINFALL DISTRICTS.

development in the fruit. In general, therefore, the fruit should always be well matured, but of varying firmness depending on the distance to be travelled and the handling it may be expected to receive.

The stage of maturity will also have a bearing on the type of container to be used in packing the fruit. For instance, if single-layer trays, with wood wool or other protective lining, are to be used, the fruit does not necessarily require to be as firm as that which is packed in the standard half-bushel cases.

Where an orchard is situated within easy reach of markets it will pay to pack the larger and higher-quality fruit in trays, as not only will such fruit carry better packed in this way, but the good quality is shown to the best advantage to the buyer.

The fruit at the tops and outsides of the trees usually matures first. All of the top and outside fruit will not mature at the same time, however, and the remainder, including the inside fruit, should be picked progressively as the size, colour, and maturity develop satisfactorily.

[*National Publicity Studios photo.*

Careful loading of peaches in the orchard for transport to the packing shed.

Maturity of Fruit for Cannery

Fruit picked for cannery supply requires to have reached a later stage of ripeness than that intended for marketing. Where the cannery is situated close to the orchard areas there is not the same obstacle of transport damage against which to take precautions. Even so growers should guard against uneven maturity of fruit for the cannery, as lines containing both firm and ripe fruit require much extra handling and sorting before processing.

Handling of Fruit in Orchard

The use of picking tins for stone fruit in preference to picking bags or aprons is recommended. The tins can be suspended from the shoulders or the waist by means of a leather or canvas belt. Less damage results to the fruit when picking tins are used, and they are more easily kept clean. When tins are full the fruit can be tipped gently into boxes for transport to the packing shed. The boxes should be cleaned out before filling, and never over-filled. Cleanliness of containers and grading machines must be assured to avoid injury or contamination of the fruit. It is essential that every effort is made to prevent the transmission or entry of brown-rot spores, and much can be done during harvesting to safeguard the fruit from infection. Orchard cases, when filled with fruit, should be stacked in shady positions while awaiting transport to the packing shed.

Supervision of Harvesting

The proper supervision of workers engaged in harvesting is most important, and success largely depends on the extent to which the orchard owner or leading hand can give this matter his personal attention.

Inexperienced pickers should be carefully instructed in their duties and then supervised closely until they are not only proficient in selective harvesting, but are also careful to prevent damage to or contamination of the fruit at all stages of handling.

Peaches

The harvesting of peaches should be carried out with due consideration to the factors already mentioned. The degree of maturity is important, and each variety should be picked at the correct stage for each marketing purpose, experience in this work being the only way to learn. The fruit should not be bruised or damaged in any way.

During the later stage of development of peaches there is a rapid sugar conversion and increase in both weight and size. This indicates the need to leave the fruit on the trees as long as possible to obtain the best quality without impairing its transport capacity. The fruit, therefore, will require to have reached a stage of development when, although reasonably firm, it will complete its ripening process properly after harvesting.

When high-class fruit is to be packed in trays a rather more advanced stage of maturity often can be allowed, especially for nearby markets.

Plums

If plums are picked while immature, the quality suffers considerably. If on the other hand they are picked at the correct stage, they will complete their ripening process after harvesting and develop into high-class, edible fruit. Under New Zealand conditions they need to be picked when there is evidence of slight softening or "give" when held between the fingers and thumb, and when a reasonable amount of colour typical of the variety is in evidence. Selective and periodic pickings are necessary, as all the fruit will not be at the correct stage at the one time. An optimum stage of maturity of fruit will assure full flavour and sugar conversion.

The later-maturing plums are capable of a longer storage life and therefore of an extended marketing period. Too-early harvesting of such varieties is both unwise and unnecessary. There has been a tendency, for instance, to harvest the Omega (syn. George Wilson) plum so early that the reputation of this fine-quality and popular plum is likely to be seriously injured.

Apricots

The degree of maturity at the time of harvesting of apricots depends largely on the distance of the markets

A tray of Kahuranaki peaches. The best-quality fruit should be packed this way.

[*National Publicity Studios photo*

Good fruit deserves good treatment in the packing shed.

from the orchard. Therefore a considerable amount of selection is necessary to ensure that the fruit arrives in the best condition. For distant markets the fruit must be picked before it is properly ripe, but it should be well coloured and quite firm. Soft and ripe fruit will not withstand long transport conditions, the amount of handling involved, or the time taken in transit.

During picking, every care should be taken not to injure the fruit, and grading, packing, and dispatch should be given attention as soon as possible for the best results.

If immature fruit is harvested, the quality, sugar content, flavour, and texture will suffer seriously and cannot be expected to improve after picking.

Some varieties of apricots tend to ripen unevenly, with only one side or end ripening at a time. This applies, in particular, to the Moorpark variety which ripens more on one side than on the other. Providing, however, that one side of this variety is reasonably matured and the other side has changed to a greenish-yellow shade, ripening usually will be completed within 2 or 3 days after harvesting.

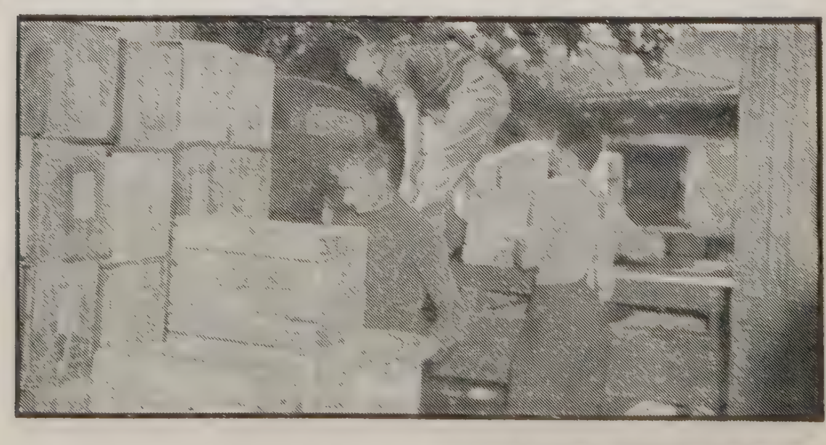
Good organisation of labour for the harvesting of apricots on large areas is essential, as most of the main varieties mature much at the same time, making the harvesting period a very busy one. The smaller average size of the fruit also tends to slow down operations, and in this respect harvesting of apricots is much on the same basis as plum harvesting. Peach harvesting is usually much quicker, owing to the larger average size of the fruit.

The use of single-layer trays for packing better-class and larger apricots has much to commend it, as it will allow the packing of fruit more advanced in maturity, providing it is reasonably firm, and of better edible quality.

Cherries

Harvesting maturity in cherries is more defined and obvious to the inexperienced picker than it is in most other stone fruits, as colour typical of the variety is usually the main feature needing consideration.

At the same time consideration needs to be given to the earliness or lateness of a variety, as the early varieties are usually softer in texture than the late varieties and cannot be left on the tree to obtain full colour, as they may deteriorate during long transport. Early varieties must be picked while they are still firm and reasonably sweet. The later and firmer varieties should be harvested when they have attained a high standard of sweetness as well as an attractive deep red or purplish red.



[*National Publicity Studios photo*

Quality fruit, packed in trays, being dispatched to the markets.

The important factors in stone-fruit harvesting are as follows:—

Careful instruction and supervision of harvesting employees.

At all times avoid the harvesting of immature fruit.

See that all fruit is mature but reasonably firm.

Firmness should be related to the distance of transport to markets.

Progressive selective pickings improve quality and condition.

Fruit for cannery supply should be of uniform and more advanced maturity.

Guard against all types of damage or injury to the fruit.

Preferably use picking tins instead of bags or aprons.

Use only picking tins and cases which are quite clean.

Pack the higher-quality and larger-sized fruit in trays.

In all operations give a thought to the consumer and the future of the industry.

◆

Radio Broadcasts

Radio talks to farmers are as follows:—

1YA Auckland, 7.15 p.m.

2 April—"Autumn Management of Stock", by G. V. Wallace, Veterinarian, Department of Agriculture, Auckland.

16 April—"Autumn and Winter Management of Pastures", by J. F. Till, Instructor in Agriculture, Department of Agriculture, Auckland

23 April—"Development of Beekeeping in New Zealand", by D. Roberts, Apiary Instructor, Department of Agriculture, Auckland.

30 April—Talk by Dominion president, Federation of Young Farmers' Clubs.

2YZ Napier, 7 p.m.

1 April—"Management of First-year Pastures in Hawkes Bay", by F. H. Collin, Fields Instructor, Department of Agriculture, Napier

1YZ Rotorua, 7.15 p.m.

3 April—"Winter Storage of Fruit and Vegetables", by F. L. Bailey, Orchard Instructor, Department of Agriculture, Tauranga.

17 April—"Winter Work in and about the Milking Shed", by E. P. Carter, Special Inspector, Department of Agriculture, Hamilton.

3YA Christchurch

3 April (at 7.15 p.m.)—"Livestock Problems of Special Interest to the Chatham Islands", by A. G. Brash, Veterinarian, Department of Agriculture, Christchurch.

10 April (at 7.15 p.m.)—Review of "Journal of Agriculture", by E. G. Smith, Extension Division, Department of Agriculture, Christchurch.

21 April (at 12.20 p.m.)—"Farming in Oxford District", by M. A. Winter, past chairman, North Canterbury Young Farmers' Clubs District Committee.

4YA Dunedin, 7.20 p.m.

9 April—"Tomato Growing", by W. G. Crawford, Vegetable Instructor, Department of Agriculture, Oamaru.

23 April—"Investigations into Fertiliser Usage in North Otago", by W. R. Lobb, Instructor in Agriculture, Department of Agriculture, Oamaru.

4YZ Invercargill, 7.15 p.m.

21 April—"Autumn Cultivation", by L. T Reid, Fields Instructor, Department of Agriculture, Gore.

28 April—"Forestry on the Farm", by P. A. Reviers, Conservator of Forests, New Zealand Forest Service, Invercargill.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 1YD Auckland on Thursdays at 7.30 p.m., 1XN Whangarei on Mondays and Wednesdays at 8.10 p.m., 1XH Hamilton on Thursdays at 12.30 p.m., 1YZ Rotorua every second Thursday at 7.15 p.m., 2XG Gisborne on Tuesdays at 8 p.m.

Pasture Establishment on Flooded Areas of Gisborne Flats

By J. G. McKEE, Department of Scientific and Industrial Research, and G. J. GRAHAM, Department of Agriculture, Gisborne

FREQUENT floods over the Gisborne flats have each left some portions of the area covered by sediments of varying type and depth. The grassing of raw flood sediments has been attempted by farmers for a number of years. This article discusses the results of experiments laid down after the 1948 and 1950 floods to determine the ability of different species to establish on raw sediments when sown at varying intervals from the time of flooding. The varying effect of superphosphate and sulphate of ammonia upon the species sown on sediments of different texture is also examined.

THE 1948 and 1950 floods were winter ones and the results obtained may not always apply to a summer flood. For this and other reasons it is not claimed that this article covers all aspects of the regrassing of sediment-covered areas, but it is considered that the information will be useful not only to those affected by future floods, but to those who plan to use colmatage, or the deliberate ponding of sediment-laden waters, to build up low-lying areas. A number of farmers have, with the co-operation of the Poverty Bay Catchment Board, already constructed banks for this purpose.

Definition of "Silt"

The term "silt" used in connection with floods means broadly almost any sediment, other than perhaps gravels, laid down by flood waters. Used in the correct sense, however, "silt" is the name given to a silky-feeling soil whose particles are of a size about half-way between those of clay and a sand. Therefore, to avoid confusion, the term "sediment" is used in this article except where a true silt is intended.

Factors Affecting Pasture Establishment on Raw Sediment

By far the most important factors affecting pasture establishment on raw sediment are the texture of the sediment and the condition of the surface at time of sowing. For the purpose of this discussion the sediments have been classified into three main types, which are described in the following table.

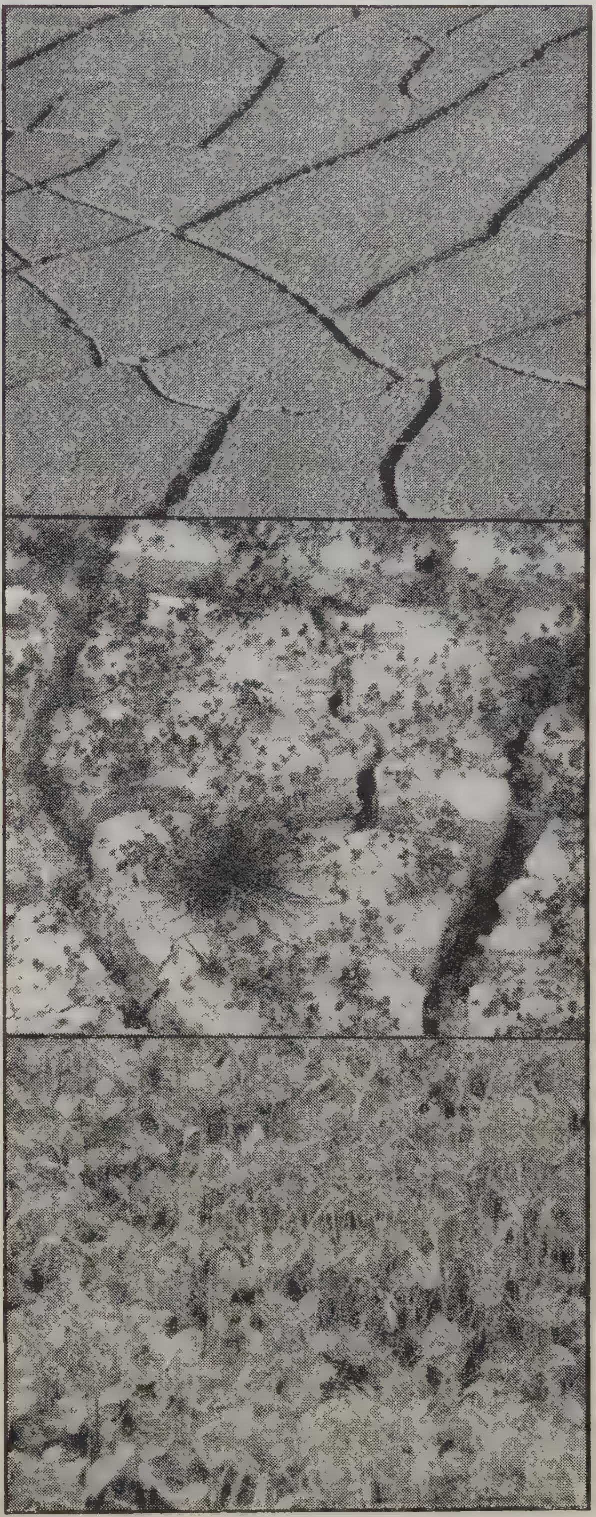
	Heavy sediment	Medium sediment	Light sediment
Texture	Clay loam to silty clay loam	Silt to silty sand	Sand
Surface relief	Flat or smooth	Ruffled	Rolling
Feel	Smooth or greasy	Slightly gritty	Gritty
Speed of drying	Retains water for some time. Surface glistens	Subsurface remains moist. Surface dries out rapidly	Water drains out very rapidly
Where usually found	Ponding areas	Fairly close to river	Adjacent to river

Recognition of Sediment Type Important

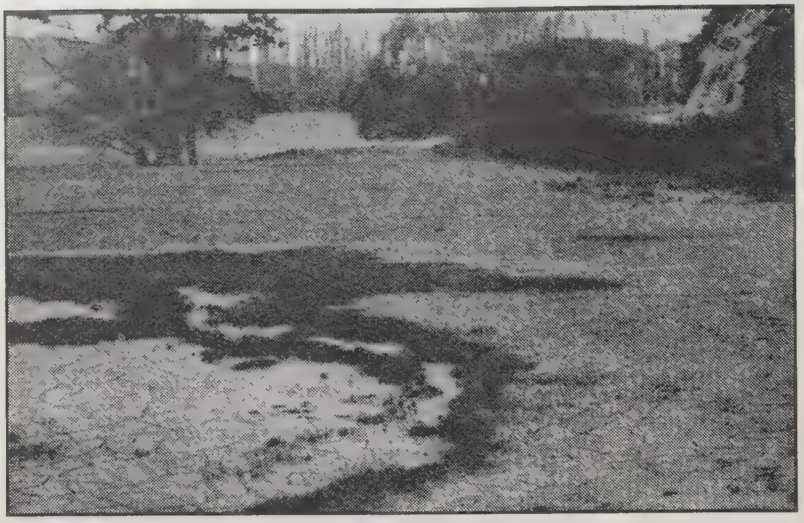
Light sediments can and should be cultivated as soon as the flood water has receded, but cultivation of the medium and heavy sediments is impossible for a considerable time. However, it is possible to obtain a good strike on these latter types without cultivation, provided the seed is sown before the surface dries out and loses its stickiness. Rain does not appear to produce the same soft sticky condition once the surface has been dry. Thus, owing to the short time at his disposal, a farmer must be able to recognise the type or types of sediment with which he has to deal. If, for instance, he has all three types on his land, it would be advisable for him to sow the medium sediment first, then the heavy, and finally the light.

Trials

After the flooding on 12 May 1948 trial areas of 1/5 acre each were laid down on 26 and 27 May at Matawhero, Te Karaka, and Puha. From these the full importance of



Photographs of the same area in September (upper), December (middle), and February (lower) show various stages in the establishment of red clover on heavy sediment.



The importance of the surface condition of sediment at time of sowing is illustrated above. The area was sown by aeroplane while there was still free water over the bottom left corner; the surface in the centre and middle distance was in the correct condition; and that farther out from the depression was too dry.

sowing immediately the water receded was realised, and within a week of the flood on 2 July 1950 six trials, also of 1/5 acre each, had been sown at Kaiteratahi, Waipaoa, and Puha. These trials were all placed to cover the three main types of sediment.

Pasture Species Used

Pasture species used in the trials were:—

Plot 1: Short-rotation ryegrass, 19lb.; perennial ryegrass, 19lb.; 38lb. per acre.

Plot 2: Short-rotation ryegrass, 15lb.; perennial ryegrass, 15lb.; white clover, 2lb.; timothy, 4lb.; subterranean clover, 2lb.; 38lb. per acre.

Plots 3, 4, and 5 were sown with the same mixture as Plot 2, but at intervals of about 2 weeks, according to the surface condition of the sediments.

Plot 6: Algerian oats, 3 bushels per acre.

Plot 7: Black barley, 3 bushels per acre.

Plot 8: Wheat, 3 bushels per acre.

Plot 9 was sown with the same mixture as Plot 2, but with clover seed treated with clover-inoculated soil. In 1948 Italian ryegrass and cocksfoot were also used.

Manures

Each plot was halved, one half being untreated and the other being dressed with ¾cwt. of superphosphate per acre. Each half dressed with phosphate was again divided, half being dressed with 1½cwt. of sulphate of ammonia per acre.

This gave comparisons between no manure, ¾cwt. of superphosphate per acre, and ¾cwt. of superphosphate per acre plus 1½cwt. of sulphate of ammonia per acre.

In one 1950 trial both superphosphate and sulphate of ammonia dressings were increased to 3cwt. per acre.

Method of Sowing

Since sowing of flooded areas has always been done by bare-footed, scantily clad hand sowers, the trial plots were sown in the same way. For farm sowing today, however, farmers have found that sowing by aeroplane is surprisingly more even than hand sowing.

Results: Grasses and Clovers

From observations of both 1948 and 1950 trials it is certain that Italian and short-rotation ryegrasses strike and grow better than perennial ryegrass when oversown on raw sediments of the medium and heavy types. Perennial ryegrass and red clover also struck well, but did not grow as well during the winter, their success depending on adequate rains in spring and early summer.

Cocksfoot and timothy struck poorly, white clover on the whole was poor, and subterranean clover failed badly.

The crop seeds (Algerian oats, black barley, and wheat) all failed, but mainly because of birds eating the seed.

Manures

Strike and growth of grasses were greatly improved by the addition of 3cwt. of superphosphate and 3cwt. of sulphate of ammonia, either used alone or mixed. The same manures at the rate of ¾cwt. and 1½cwt. per acre respectively gave good responses on the medium and light sediments, but had only slight effect on the heavy.

More work will be done to determine the best rate of application, which at present appears to lie between the extremes tried.

Despite the obvious advantages gained from a better strike and faster early growth, it must be admitted that the unmanured areas improve vastly when the weather is favourable in spring and early summer. This is probably due to the evaporation of excess water enabling a better root system to develop, the release of plant foods from old buried pasture, and the effects of stock manure.

Up to the present farmers have not used manure with their seed because of the difficulty of hand sowing on silted areas, but with aerial sowing the advantages of using manures can be gained readily.

Conclusions

Conclusions from the trials are:—

1. On light sediments oversowing is not worth while because they dry out fairly rapidly. Cultivation, after the grading out where necessary of surface irregularities, is recommended and should aim at bringing some of the old topsoil to the surface. If the flood occurs before July, a pasture sowing may be made in the normal way; if it occurs after July, a crop should be taken preparatory to sowing the land to pasture in autumn.

2. Heavy and medium silts, if sown before the surface has dried, will produce eventually a good pasture from oversowing. If the work is not done before drying takes place, the area should be left until it is cultivable; then it should be worked and sown to crop to prepare it for sowing the next autumn. Again this cultivation should aim at bringing some of the old topsoil to the surface. On areas covered too deeply for this to be done a deep-rooted crop should be sown.

3. The time to oversow medium and heavy silts is when the waters have subsided but the surface is still sloppy. Once the surface has caked even slightly oversowing will fail owing to poor germination and heavy bird depredation. Sowing while water is still well above the surface is likely to result in excessive rotting of seed and the floating away of the lighter seeds.

Since the time of sowing is critical and the suitable period is short, aeroplanes will be invaluable for resowing flooded country. Where they are used, however, there is risk of some of the seed drifting over areas used for certified-seed production and care should be taken either to avoid the contamination or to sow only suitable seeds.

4. The best grasses to sow are Italian or short-rotation ryegrass mixed with perennial ryegrass and red clover at the rate of 15lb. of each ryegrass to 4lb. of red clover.

5. Although there was only one good strike of white clover, it is considered that the trials have been too limited to condemn its use and that the inclusion of 2lb. in the mixture would be worth while. In case of failure, an autumn oversowing should be made.

6. The use of at least 1cwt. of superphosphate at the time of sowing will greatly increase strike and early growth, and the addition of the same amount of sulphate of ammonia may be worth while.

From observations made in December 1950 of the responses to stock urine and dung it is obvious that organic matter is a main requirement of the "new" soil. Therefore stocking of newly sown areas should begin as soon as the soil is in suitable condition and supplementary feed could be supplied to permit stocking to be heavy.

Acknowledgments

The assistance of W. A. Pullar of the Soil Bureau, Department of Scientific and Industrial Research, in classifying sediments is acknowledged.

Trials of Flue-cured Tobacco Varieties

TO obtain the best returns from a crop of tobacco the most suitable variety must be grown. Choice of variety is governed by soil and climate, the same varieties producing different results under varying conditions. So much is this the case that usually each country has developed its own group of varieties most suited to its local requirements. To determine those most suited to New Zealand conditions field trials of flue-cured varieties have been carried out at the Department of Scientific and Industrial Research's Tobacco Research Station, Motueka, for a number of years. In this article R. Thomson, Director of the Station, describes the results of these trials.

Tobacco crop in the Riwaka district with curing kilns in the background.

THE tobacco-growing district in New Zealand is relatively compact, being confined to Waimea County of the Nelson Province. There is a fairly wide range of soil types, but the climate is much less diversified. While individual variations, such as in the prevalence of wind or earliness of frosts, do occur, in a broad sense the climate throughout the growing district is reasonably uniform. For this reason the requirements of the district probably would be met by a much smaller number of varieties of tobacco than would be the case in a country where there was a greater range of both soil and climate.

Before the establishment of tobacco growing in this country New Zealand was entirely dependent on the United States for its tobacco requirements, either directly as raw leaf or indirectly through manufactured products. The public taste was therefore built up on Virginia-type leaf and it was necessary that the characteristics of any leaf grown in New Zealand should conform fairly closely to those of the imported article which it would eventually replace. With this objective obviously the first varieties to be grown here would be those which were in general cultivation in the United States. Some of these had definite shortcomings in yield or quality, and subsequent trials have had the object of finding a variety which would give a good return to the grower and at the same time not differ too widely from the imported leaf in quality.

Material and Methods

The first trials included all the chief varieties that were in general cultivation in the United States. As information was gained on these they were dropped from the trial and other more recent introductions included. In addition to varieties from the United States, flue-cured tobaccos were received from Canada and Rhodesia and these were tested for their performance under local conditions.

Plots consisted of 100 plants each. At the beginning of the trials, when a large number of varieties was under consideration, it was not possible to grow more than two replications. Early trials indicated some definitely unsuitable varieties, and by omitting these it was possible to increase the number of replications to four. Trials were continued over a varying number of years. If a variety possessed some outstanding defect, such as extreme susceptibility to black root rot, or an undesirable leaf type, it was discarded after 1 or 2 years. On the other hand varieties showing promise were carried on up to 6 seasons. All received the same cultural and fertiliser treatment. One weak point in the trials was the necessity to cure all the varieties together in the same kiln, and as all did not have the same leaf characteristics, this obviously reacted to the detriment of some lines.

With such a large number of varieties in trials extending over varying

TABLE 1—YIELD PER ACRE OVER A PERIOD OF 7 YEARS

Variety	Yield per acre								No. of years	Yield of H. Sp. 215 for same period	Yield as % of H. Sp. 215
	1942-43	1944-45	1945-46	1946-47	1947-48	1948-49	1949-50	Average			
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.		lb.	
Harrisons Special 215 ..	1354	1642	1824	1958	1415	1699	2015	1701	7	1701	100.0
Harrisons Special 218 ..	1147	1253	1304	1406	883	765		1126	6	1649	68.4
Special 400	1246	1451	1825	1701	1287	1415		1487	6	1649	90.2
Special 401			1788	1757	1466			1670	3	1732	92.8
Special 402				1636	1434	1194		1421	3	1691	84.0
Yellow Special		1239	1380	1735				1451	3	1808	80.3
Broadleaf	1478	1277	1455	1867				1519	4	1694	89.7
Gold Dollar	1017	1031	1400					1149	3	1607	71.5
White Mammoth ..	1021	1198						1110	2	1498	73.5
Yellow Mammoth ..	1107	1127	1377					1204	3	1607	74.9
Virginia Bright Leaf ..	993	884						939	2	1498	62.6
Jamaica Wrapper ..	784	557						671	2	1498	44.8
Cash	824	482						654	2	1498	43.7
Bonanza	984	914						949	2	1498	63.3
Mammoth Gold	894	860						877	2	1498	58.6
W. S. Orinoco	1072	976						1024	2	1498	68.4
Duquesne	1204	861						1033	2	1498	69.0
Meadows Giant	1204							1204	1	1354	89.0
Oxford 1					928			928	1	1415	65.6
Oxford 3					877	858		868	2	1557	55.8
Oxford 26					1083			1083	1	1415	76.6
Delray			1518	1500				1509	2	1891	79.8
Delcrest						1079	1260	1170	2	1857	63.0
C-7/46							943	943	1	2015	46.8
C-10/46							1152	1152	1	2015	57.2

LIFTING — SHIFTING

ROPELOCK
This reliable rope hoist will lift up to ½ ton. Special "Ropelock" feature, which holds load when rope is free. Good for horizontal and angular pulling as well as vertical lifting.

MINILIFT
Portable, light weight, efficient lifting unit. Geared for easy lifting.

Aluminium Alloy construction. Models to lift 8 cwt. and 15 cwt.

HAND CHAIN HOIST
High efficiency, spur gears. Totally enclosed mechanism. Capacities, 5 cwt., 10 cwt., etc., up to 10 tons.

KING ELECTRIC PULLEY BLOCK
Will work wherever there is electric power. This efficient hoist will lift loads up to 3,600lbs. at the touch of a button.

WOOL BINS
For efficient sorting and handling. . . . Strong, manoeuvrable, capacious, smooth finish. . . . Supersedes the wicker basket.

MASTER TRUCKS
The balanced hand truck for sacks, bales, cases, etc. Roller bearing wheels give easy rolling with heavy loads.

DRUM DRAINERS
Makes tilting, pouring 44 gallon drums a ONE man job. . . . Safe, no waste.

MECHANICAL MOKE
Inexpensive power barrow. Tip body or flat deck.

12 cwt. capacity.

Write for booklet giving all details.

MATERIALS HANDLING
EQUIPMENT CO. LTD.
GRACEFIELD RD., LOWER HUTT.

more farmers use SHELL than any other spirit

Judged first among motor spirits—you must have SHELL the leading motor spirit for easy starting, lively performance and clean combustion. Go for SHELL, the research-backed, power-packed motor spirit.

SHELL

The Shell Company of New Zealand Limited, (Incorporated in England) K12.2D

(ISSUED BY THE NEW ZEALAND DEPT. OF HEALTH)

Beware of HYDATIDS

these are the FACTS . . .

The dreaded Hydatid tapeworm is being carried at this moment by 50,000 country dogs in New Zealand. Between a third and a half of our sheep, cattle and pigs have cysts in the liver or lungs, SO, FARMERS, HELP TO DESTROY THIS SCOURGE, DO NOT ALLOW YOUR DOGS TO EAT RAW OFFAL and become reinfected. Boil it first, or burn or bury it. Dogs do not grow cysts; they spread the eggs of the Hydatid tapeworm, which if they get into the human bloodstream, can cause dangerous cysts in the liver, lungs or even heart and brain. THE REMEDY IS SIMPLE, DOSE YOUR DOGS NOW with a vermifuge and KILL HYDATID TAPEWORMS.

the PRECAUTIONS are simple . . .

NEVER put hand to mouth after handling dogs. ALWAYS wash your hands and the children's *before every meal*. ALWAYS wash carefully all vegetables and fruit eaten raw. NEVER throw raw liver or lungs of sheep to dogs. ALWAYS cut offal into slices and boil first. If not, burn or bury it.

DOSE YOUR DOG WITH A VERMIFUGE EVERY THREE MONTHS

Arecoline is supplied for this purpose; it can be obtained with your dog licence.

EXPEL THE WORMS, NOW.

DOSE YOUR DOGS NOW!
Never feed them on raw offal

9.1

numbers of years some difficulty was experienced in presenting the results in a form which would enable the necessary comparisons to be made. This was overcome in Table 1 by showing the average yield per acre over the period the particular variety was included in the trials, the average yield of the standard variety Harrisons Special 215 over the same period, and the yield of the variety expressed as a percentage of Harrisons Special 215.

In Table 2 the yields of a number of varieties grown on land infected with black root rot are set out. Infection of the area was uniform but not heavy and was most evident in the early stages of growth.

In both tables Harrisons Special 215 has given the highest yield. Harrisons Special 218 on clean land has yielded considerably less and on infected land less still. The Special 400 tobaccos have all yielded well, but none equalled the yield of Harrisons Special 215. Under conditions in which black root rot prevailed their yield has been equally high, demonstrating that under these conditions they possess a fair degree of resistance. On clean land the Broadleaf variety is a relatively high yielder, but on infected land the yield is greatly reduced. The yields of all the other varieties are relatively low.

[*Ellis Dudgeon photo.*

Grading tobacco leaf in a Riwaka grower's shed.

Notes on Varieties

Harrisons Special 215 grows fairly erect. The leaf is broad at the base with a good spread, tapering off to a point. The upper leaves generally fill out well. Body and texture are both good. The variety produces very few laterals, which adds to its popularity with growers. It has a moderate tolerance to black root rot, producing good yields under conditions of light infection, but sometimes failing where infection is heavy. It is a consistently high yielder.

The variety known as **Harrisons Special 218** is not Harrisons Special, but has been grown in New Zealand under that name for many years. The plant is semi-erect. The leaf is narrow, tapering to a narrow point. The upper leaves are small. The body and texture are very good and the variety is very easy to handle in the kiln. It is very susceptible to black root rot and has gone entirely out of favour, except for new land, on which it does not grow as rank as Harrisons Special 215.

Broadleaf is a local name; the origin of the variety is not known, except that it came from the United States. It grows fairly tall and the leaves are well spaced on the stem and stand out fairly well. The leaf is very broad, oval, and with a good spread, the upper leaf usually developing well. The texture is thin and the leaf cures out bright. Broadleaf appears to be particularly suited to soil of the Moutere type. It is very susceptible to black root rot.

Special 400 was developed in the United States about 1940. The plant grows medium tall, the leaf is broad and rounded, cutters and lugs are particularly good, and the width is carried well into the upper leaves. The texture is fine and the colour usually bright. The variety produces laterals freely. It has about the same field resistance to black root rot as Harrisons Special 215. It is suitable for growing where the broadleaf type is desired and root rot is a limiting factor.

Special 401 is of the same general type as 400. It is taller growing and the leaves are spaced farther apart on the stem and are not quite so wide. The texture is fine and the quality good. There is doubt as to whether it is quite as resistant to black root rot as Special 400.

Special 402 resembles Special 400, but the leaf is broader. The upper leaf is usually particularly good. The texture is fine and the colour generally bright. This variety produces laterals freely and is definitely less resistant to root rot than is Special 400.

Yellow Special in growth has been indistinguishable from Special 400, but the yield has been consistently less than from that variety.

Gold Dollar, White Mammoth, Yellow Mammoth, Virginia Bright Leaf, Jamaica Wrapper, Cash, Bonanza, Mammoth Gold, W. S. Orinoco, and Duquesne are distinct varieties and have their own characteristics. However, they have certain features in common which for the purpose of the trial justifies grouping them. They all have a narrow, tapering leaf, which under New Zealand conditions appears to grow narrower than it does in the United States. Each produces a leaf of good body and texture which is fairly easy to cure and each is susceptible to black root rot. Of these varieties, Gold Dollar, White Mammoth, and Yellow Mammoth have given the highest yields and the most consistent quality. They are not recommended for general cultivation, but on new land may not grow as rank as Harrisons Special 215. Duquesne, a Canadian variety, is the earliest variety of all and as such may have a specific value.

Meadows Giant is a South African variety. It belongs to the "Mammoth" type of tobacco which does not flower except under short-day conditions. At the Tobacco Research Station it has produced up to 80 leaves without any sign of inflorescence. The leaf is not large and the quality is poor.

TABLE 2—YIELD PER ACRE OF VARIETIES GROWN ON SOIL INFECTED WITH BLACK ROOT ROT

Variety	Yield per acre 1944-45 lb.	1945-46 lb.	1946-47 lb.	1947-48 lb.	1948-49 lb.	Average lb.	No. of years	Yield of H. Sp. 215 for same period lb.	Yield as % of H. Sp. 215
Harrisons Special 215	1486	2235	2185	1998	1601	1901	5	1901	100.0
Harrisons Special 218	735	1298	1342	1646	728	1150	5	1901	60.5
Special 400	1277	2222	2020	2180	1402	1820	5	1901	95.2
Special 401		2055	1817	1931		1934	3	2139	90.5
Special 402			1913	1984	1190	1696	3	1928	88.1
Yellow Special	1210	1958	1770			1646	3	1969	83.6
Broadleaf		1532	1472			1502	2	2210	68.0
Oxford 1					745	745	1	1601	46.6
Oxford 3				1506	768	1137	2	1799	63.2
Oxford 26				1515	768	1142	2	1799	63.2
Delray		1814	1632	1884		1777	3	2139	83.1
Delcrest					945	945	1	1601	59.0

Delray is raised in Canada. The plant is not tall, the growth is spreading, and the leaf is narrow, running off to a point. It cures out very bright and has good body and texture, but the midrib is very thick. It is susceptible to black root rot.

Delcrest is a later introduction from Canada than Delray. Growth is semi-erect. The leaf is broad at the base, tapering off sharply to a narrow point. The texture and body are good and the leaf generally cures out well to a bright colour. The midrib tends to be heavy. Of the varieties tested so far, Delcrest is the flue-cured variety most resistant to black root rot.

C-7/46 and **C-10/46** are from Rhodesia. They produce long narrow leaves, with very poor spread. Growth of laterals is profuse. Both varieties are susceptible to black root rot.

Oxford Varieties

The Oxford varieties were raised specifically for resistance to certain diseases. Thus Oxford 1 and 3 are resistant to black shank and Oxford 26 to Granville wilt. When they were released it was acknowledged that they were not all that could be desired in quality, but the need for disease-resistant lines was so urgent that it was deemed advisable to distribute them. The three varieties are susceptible to black root rot.

Oxford 1 is a variety of the Harrisons Special 218 type. The leaves are long, narrow, and pointed, and growth is semi-drooping. The cured leaf generally tends to be orange, heavy bodied, and slightly harsh in texture.

Oxford 3 in general growth is similar to Oxford 1. The leaf is long and narrow, with medium body. The cured leaf has a distinctive olive-green cast and a pungent aroma.

Oxford 26 is a distinctive variety with erect growth and leaves standing out sharply from the stem. The leaf is short, wide, and heart shaped; the cured leaf is generally lemon, of fine texture and medium body.

Discussion

Of all the varieties under trial, Harrisons Special 215 has consistently outyielded the others, at the same time producing a good-quality leaf. It has a moderate degree of resistance to black root rot and its characteristic of producing relatively few laterals makes it additionally attractive to growers.

The variety grown as Harrisons Special 218 has almost disappeared from commercial culture. It falls into what is known locally as the narrow-leaved group of varieties, and as such is not in favour with either growers or manufacturers. In addition it is extremely susceptible to black root rot. Because of their similar growth and their susceptibility to root rot, a number of distinct varieties has been included in the same group. Their yield is low and their only possible place in New Zealand tobacco growing would be on "new" tobacco land, where they do not grow as rank as Harrisons Special 215.

Broadleaf has proved to be a good variety where a wide leaf of fine texture is required, but it is also very susceptible to black root rot.

Of the 400 group, Special 400 has proved to be the best. Its yield has been consistently high and it possesses greater root-rot resistance than the others. It is a broad-leaved, fine-textured variety and should be grown where Broadleaf has been eliminated by root rot.

The Canadian varieties have proved disappointing. Although Delcrest showed a high degree of resistance to root rot, its yield even under clean conditions was too low to recommend it for general cultivation, although the leaf was of high quality.

The Oxford varieties were produced for resistance to specific diseases, and as these diseases have not been recorded in New Zealand these tobaccos have no place under local conditions.

Farm Tree Planting

LATE winter or early spring is the normal season for tree planting in localities where there are neither hard frosts nor strong winds. The best time depends also on the type of soil; with heavy soils in areas of strong winds it is best to delay tree planting until the soil dries out somewhat to keep the trees firmly fixed in the ground. In light soils and with early-spring winds planting can be started best in autumn so that trees get well established before conditions become dry.

Early in winter the land should be prepared for planting. Ploughing either completely or in narrow strips for tree lines is good, especially in weedy areas, but this cultivation should be done some months before planting so that the ground can consolidate sufficiently to hold the trees firmly in wind. If stock have access to the area, adequate double fencing must of course be erected before planting is started.

Planting Methods

The method of planting depends on the type of land; for example, trees should be notched into a ploughed strip in heavy soils or pit-planted or notch-planted in light soils on fern or scrub land. Where quick initial growth is required, as in homestead planting, some well-rotted farmyard manure or compost may be ploughed into the soil or incorporated with soil at the bottom of the pits so that it cannot come into direct contact with the roots.

Planting Stock

The quality of planting stock is important. A good fibrous root is of more value than a tall, heavy top, and smaller trees 9in. to 12in. high can adjust themselves more readily to the rougher conditions of the plantation site. Trees raised on the farm should be prepared for lifting by periodic wrenching in the nursery from the time they are 4in. to 5in. high; this will increase the fibrous roots. Certain species such as *Cupressus macrocarpa, Cupressus benthami,* and some *Eucalyptus,* are sometimes difficult to establish, and if this occurs, specially "balled" or "trayed" trees should be used. These are more costly than open-rooted plants but are reliable. They should be ordered some months before planting time.

Full information on this subject is contained in Departmental Bulletin No. 346, "Homestead Shelter Planting".

—M. SUTHERLAND,
*Farm Forestry Officer, Department of Agriculture,
Wellington*

BOOK REVIEWS

"Forest Taxation in Europe and New Zealand"

IN the past there has been considerable misunderstanding among farmers of the ramifications of New Zealand law that governs the taxation of growing or mature tree crops. All farmers and others who are concerned with this important matter will welcome the very comprehensive and complete survey of the subject which has been made by M. B. Grainger, Forest Economist, in information series Bulletin No. 11 of the New Zealand Forest Service.

The long-term nature of tree growing with which is involved a system of irregular expenditure and intermittent income makes forest taxation a difficult matter to deal with equitably between owner and State interests and yet encourage the expenditure necessary to establish and maintain growing tree crops efficiently.

The author examines the existing status of forest taxation in New Zealand and compares it with the systems used in various timber growing countries of Europe. He has compiled a list of certain anomalies which exist in the New Zealand system and which in many cases definitely mitigate against increased farm tree planting, as, for example, in shelter belt planting where formerly it has not been allowable to deduct costs of establishment before assessment for income tax, or, again, where farm trees may become a liability through the charging of death duties on the value of the standing timber, a process which may be repeated more than once in the life of the trees.

Chapter VIII is the most important section for the New Zealand farmer, as anomalies are enumerated and means for their correction are suggested, while in Appendix III the taxation concessions granted by recent legislation are set out clearly.

—*M.S.*

New Zealand Forest Service. 5s. 9d.

"An Experiment in Forestry": N. D. G. James

THE story of 10 acres of trees laid out 46 years ago in experimental plots of various species and combinations at Cirencester in England is told in this book. As so often happens in research, inspection and management of the plantations were affected by economic circumstances and the trees were subjected to periods of total neglect during two world wars. To British tree growers the descriptions of these plots are of definite value in assessing the comparative and competitive growths of different species used on one type of good agricultural, but mostly unsuitable forest, soil.

The book demonstrates the possibilities and dangers of variety planting in mixed crops, a point which is little appreciated in New Zealand, where the ease of growing *Pinus radiata* has during this century coloured the whole practice of farm tree planting.

—*M.S.*

Basil Blackwell, Oxford. 10s. 6d.

Importance of Lime in Southland Farming

By W. FAITHFUL, Fields Instructor, Department of Agriculture, Invercargill

LIME is an extremely important factor in high pasture production in Southland; in fact, it is the pivot around which the farming practice of the district revolves. During recent years the number of fat lambs sent to freezing works has shown a steady increase, the total for 1949 being four times that for 1929. Extremely high average yields for oats and wheat are also a feature of farming in Southland. To assist in maintaining this production the 13 quarries in the province produce between 300,000 and 350,000 tons of lime a year.

BECAUSE of the rigorous winters, when pasture growth is virtually dormant, a standard of farm husbandry probably higher than in any other part of the Dominion is required in Southland. Adequate winter feed and maintenance of pasture production depend on several important factors, but there are two fundamentals: First, efficient drainage; secondly, adequate applications of lime.

Topography, climate, and soil types are all linked, and each has a bearing on the others. The basic topography of Southland is shown on the map on page 206. To the west lies the great bulk of the mountains of Fiordland, and this mountainous country is continued into the north and north-west. From these mountain systems run the ever-widening valleys of the main rivers, which flow approximately south into Foveaux Strait. Parallel with the rivers are the Longwood Range, the Taringaturas, and the Hokonui Hills; the last are of particular importance, as they exert an influence on climate and rainfall in various areas.

Rainfall

Rainfall, an important climate factor in connection with liming, varies from 45 to 49in. in the coastal areas to 30in. in inland districts. The prevailing winds are from the south-west, and the storm clouds striking the western side and southern tip of the Hokonui Hills are diverted, so that there is higher precipitation on the west side of these hills than on the east. The Winton and Dipton districts west of the hills have an average rainfall of from 32in. to 37in., while Wendon, on the eastern side, has approximately 30in. The average rainfall in the Gore district is 34in. Rainfall is fairly evenly distributed through the year, though the period of lightest rainfall is often during winter.

An inch of rainfall represents approximately 100 tons of water per acre. It will be realised therefore that in Southland lime is quite readily leached or washed out by water and is drained away, as the average yearly rainfall totals already mentioned represent between 3000 and 5000 tons of water per acre every year.

Liming on grassland.

Working at the face of a Southland lime quarry.

Increase in Sown Pasture

During th past 20 years there has been a fairly steady increase in the acreage of sown pasture land in Southland, and through greater use of improved strains of grasses and clovers and increased liming and topdressing there has also been an extension of the growth period of pastures. In the last 20 years there has been a marked decline in dairy farming in favour of sheep farming, with emphasis on fat-lamb production. The trend of farm practice is toward grassland farming and limiting the use of the plough, commensurate with provision of adequate supplementary lamb-fattening feed and winter keep for stock. This does not mean that the acreage ploughed is negligible or that farming is confined to fat-lamb production. Approximately 30,000 acres of greenfeed crops, 100,000 acres of root crops, and 35,000 acres of grain are grown each year. In addition a considerable acreage of hay is saved and in a normal season approximately a third of the small seeds exported from New Zealand are grown in Southland.

Tables 1, 2, 3, and 4 show in detail the acreages of sown grasslands, supplementary feed, hay saved, and grain grown and the trend toward fat-lamb farming.

TABLE 1—INCREASE IN AREA OF PASTURE LAND

Average of 5-year period		Total area occupied acres	Unimproved acres	Area of sown pasture acres
1924–25 to 1928–29	..	3,240,169	1,906,368	1,117,876
1934–35 to 1938–39	..	3,269,744	1,956,164	1,157,854
1944–45 to 1948–49	..	3,283,809	*1,880,932	1,236,273
Season 1948–49	..	3,234,299	1,855,584	1,223,307

* 4-year average—figures not available for 1944–45.

TABLE 2—ACREAGES OF SUPPLEMENTARY FEED

Average of 5-year period		Green fodder acres	Turnips, swedes, and mangolds acres	Hay and silage acres
1924–25 to 1928–29	..	26,683	111,177	7,481
1934–35 to 1938–39	..	21,783	*108,757	19,402
1944–45 to 1948–49	..	28,018	*109,802	34,372
Season 1948–49	..	30,464	*107,355	40,835

* 1934–1949 turnips, swedes, mangolds, and rape.

The increase in the acreage of supplementary feed is consistent with the trend in fat-lamb production and the fattening of lambs on feed. The acreage of turnips has declined, due in some measure to the extended growth period of improved pasture plants and to liming and topdressing of them.

There's no better Phenothiazine than Elliott's

PHENZEEN PLUS

Farmers throughout New Zealand are again demonstrating their preference for Phenzeen Plus with a rush of orders for this drenching season.

The Original Liquid Phenothiazine

Phenzeen Plus was the first ready-mixed liquid phenothiazine, and the first to overcome the need for continual stirring. That early leadership is still maintained in an even better product.

The Only Double Processed Liquid Phenothiazine

The technical staff of Premier Products Ltd., the New Zealand manufacturers and distributors of Phenzeen Plus, has developed an exclusive double-process formula which makes Phenzeen Plus uniform from top to bottom of the tin. It pours freely to the last drop and under no conditions does it settle hard. It's ready to use and easily administered with the Phenzeen Plus Automatic Injector or Dub-Ell-Dose Pistol. Supplies are good but demand is increasing daily, so

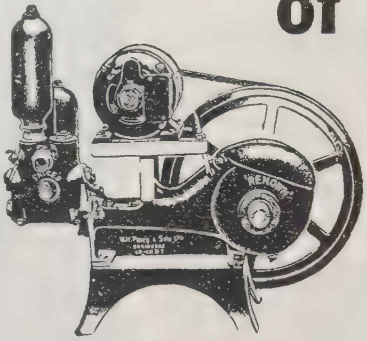
Don't be Disappointed . . . Order Now

Agents and Stockists everywhere. If any difficulty is experienced in obtaining supplies write to the N.Z. Manufacturers and Distributors:

PREMIER PRODUCTS LTD.

HUDDART PARKER BUILDING,
WELLINGTON.

The Value of Experience



See this model on view in our Showroom.

W H Price's Renown Pumps have no equal in value and performance . . they incorporate the engineering, technical and manufacturing experience gained in 71 years of quality pump manufacturing. Expert installation advice and service ensures lifetime efficiency

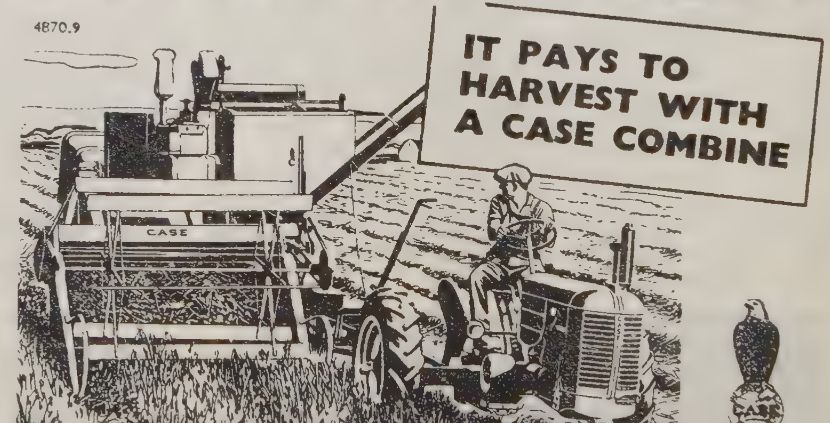
W. H. PRICE & SON Ltd.

34-36 Manchester St., Christchurch.
P.O. Box 1084. Established 1879.

RENOWN

MODEL "350" PUMP

SAVES ALL SEEDS


4870.9
IT PAYS TO HARVEST WITH A CASE COMBINE
CASE

DISTRIBUTORS:

John Chambers & Son Ltd., Sole N.Z. Agents. Auckland, Wellington, Christchurch, Dunedin, Invercargill, Timaru, Hamilton, Palmerston North, New Plymouth, Ashburton, Nelson.

CASE

Whatever crops you grow, from small grains to tiny clover and fluffy grass seeds, there is one combine that will do a superb job of saving them at harvest time. That is the 6-foot Model "A" Case Combine—proved all over the world in more than 100 different crops—built to get every last possible kernel and to get *it clean*. Ask your Case distributor.

TABLE 3—ACREAGE AND YIELDS OF WHEAT AND OATS

Average of 5-year period	Oats: For chaff, hay, or silage: acres	Oats: For chaff, hay, or silage: tons per acre	Oats: For threshing: acres	Oats: For threshing: bushels per acre	Wheat: acres	Wheat: bushels per acre
1924–25 to 1928–29 ..	36,382	1.72	22,468	46.30	3,714	35.39
1934–35 to 1938–39 ..	33,332	1.84	16,678	53.08	3,944	35.79
1944–45 to 1948–49 ..	14,945	2.16	17,421	67.15	8,328	47.51
Season 1948–49 ..	10,252	2.18	18,214	63.44	11,192	49.88

TABLE 4—TREND TOWARD SHEEP FARMING

Average of 5-year period	Dairy cows in milk (incl. boroughs)	Total cattle (incl. boroughs)	Breeding ewes at 30 April	Lambs tailed
1924–25 to 1928–29	.. 67,747	161,352	1,125,035	995,984
1934–35 to 1938–39 ..	.. 70,573	162,972	1,808,326	1,677,145
1944–45 to 1948–49 ..	.. 50,557	153,721	*2,344,043	2,388,114
Season 1948–49 ..	.. 50,919	162,010	2,516,397	2,557,628

* 4-year average—figures not available for 1945–46

These yields are among the highest in the Dominion; in fact, the world record yield for wheat, 112 bushels per acre, is credited to Southland. Yields of chaff of up to 5 tons per acre have been recorded and yields of upward of 100 bushels of oats per acre are not uncommon.

An increase in sheep population (see Table 4) has accompanied the increase in area of sown pastures.

Table 4 shows that dairy cow numbers have decreased by 17,190 (by 5-year averages), but total cattle, including dairy cows, have been reduced by only 7631. The significant figures are the increases in breeding ewes and lambs. As the sheep population of the tussock land has remained fairly constant, the extra sheep have been carried on the sown-grass lands.

The figures of slaughterings of lambs, ewes, and cattle at the three Southland freezing works are also of interest, as they are directly linked to the cycle of improvement initiated by the use of lime in Southland.

TABLE 5—TOTAL LAMBS, SHEEP, AND CATTLE SLAUGHTERED AT 30 SEPTEMBER

Average of 5-year period	Lambs	Sheep	Cattle
1924–25 to 1928–29	372,883	45,943	4,408
1934–35 to 1938–39	1,109,131	135,260	4,149
1944–45 to 1948–49	1,673,129	256,724	9,662
Season 1949–50	2,015,020	294,581	12,453

In addition a considerable number of animals are sent to works outside Southland.

The use of lime has been one of the main factors in the steady increase in primary production in Southland. That Southland farmers are fully aware of the necessity for adequate liming is shown by the fact that most of the 300,000 tons of lime produced in Southland a year is used in the district. In 1928 there were 4 works (with an output of about 47,000 tons) in the district.

History of Liming

Changes in farm practice in Southland have had a great influence on the use of lime there. When horses were used widely for draught extensive areas were used for the growing of oats for chaff. It was common for a number of consecutive crops to be taken and, though no artificial fertilisers or lime were used, good, payable yields were secured, but the virgin fertility of the land was quickly depleted.

Some of the early settlers before they left for New Zealand had seen the benefit from liming land, but it was not until the adverse effects of grain cropping became evident that thought was given to the necessity for liming the newer land here. About 1880 a limeworks was started at Milburn, Otago, by Mr. James McDonald—this was probably the first limeworks in New Zealand—but the lime from this works was used in the Taieri district, Otago.

The first record of lime being used in Southland was at Edendale in 1890. A report from "The New Zealand Journal of Agriculture" of 21 August 1916 reads:—

> The district of Southland and the adjoining districts of south Otago have been the pioneers in the use of lime in connection with the agriculture of New Zealand. The first to use lime on an extensive scale in this country was the New Zealand and Australian Land Company on its Edendale Estate in Southland. The company made a beginning in 1890, during which year it limed about 200 acres. It continued the work until it disposed of the property in 1904, partly by sale and subdivision to settlers, and partly by sale to the Government for closer settlement. During these fourteen years the company limed about 6000 or 7000 acres with an average of about 2 tons of burnt lime per acre. The use of [burnt] lime on an extensive scale has been continued since 1904 by the settlers, and the Edendale and surrounding districts are now by far and away the best example of successful liming to be found in the Dominion. The credit for initiating and continuing this work belongs to the late Mr. Thomas Brydone, then superintendent in New Zealand for the Land Company, and Mr. Donald Macdonald, who managed the Edendale Estate during the whole period that the company was using lime upon it.

Burnt Lime and Carbonate of Lime

The first lime used was burnt or "shell lime" as it was called; some of the earlier settlers had had previous experience of such lime and, furthermore, at this time the use of ground limestone or carbonate of lime was not known. The first limeworks in Southland to produce lime for agricultural purposes was started in 1883 at Limehills by the same James McDonald who opened the Milburn deposit. The Limehills kilns are still standing and were operated until a few years ago. Shortly after 1883 a small works was opened at Fairfax, where lime was being burnt by a Mr. Meek. The lime used on the New Zealand and Australian Land Company's property at Edendale came from the Limehills works.

In 1904 carbonate of lime was introduced to Southland farmers by J. E. Watson and Company Ltd., who opened a works at Forest Hill. This works was on the property of a Mr. Queale, who had had good results from spreading on his land limestone taken from the surface of the deposit. About the same time Mr. G. D. McIndoe, an analytical chemist who had seen good results from the use of carbonate of lime in Great Britain, became keenly interested in the matter, and he analysed many samples of limestone.

However, development was slow. Farmers had become accustomed to the more spectacular response from the use of burnt lime and consequently were disappointed with the usually slower response from carbonate. Opposition to the use of carbonate of lime became marked; in fact, a product was the subject of litigation, which proved of intense local interest, as much expert opinion, which was by no means unanimous, was called. Though the case was won by the lime-producing company, the decision did little in helping to overcome opposition to the use of carbonate of lime.

An extensive campaign to foster the use of ground limestone was undertaken by Mr. McIndoe, assisted by Mr. (later the Hon.) A. F. Hawke, and Mr. W. (later Sir William) Hunt. Mr. Hunt had not long returned from America, where carbonate of lime was being used successfully in agriculture.

Cocksfoot in stook. Heavy yields of wheat, oats, and grass seed are common in Southland.

LADER BROS
FARMERS
WENSDALE

Loading lime on to a farmer's lorry at a Southland works.

Most of the meetings attended by the three enthusiasts were "very stormy", and some were quite hostile, but they nevertheless paved the way for development.

The works at Forest Hill were abandoned eventually, chiefly because lime had to be taken 5 miles over a rough bush tramway to the rail, but other works were opened.

Development of Limeworks

In 1901 the works at Limehills were taken over by J. G. Ward and Company Ltd., and a works at Browns was opened about 1912. (This works is now known as the Browns Lime Company.) In the same year a works was also opened at Clifden; it is now known as the Clifden Lime Company. In 1917 Mr. J. Doherty, whose name is closely associated with the development of the use of lime in Southland and who had been keenly interested in the works at Browns, opened a quarry at Lady Barkly. Farmers in the various districts were not particularly interested in the opening of the works; in fact, large quantities of carbonate of lime (in total, hundreds of tons) were given to farmers to convince them of the good qualities of this form of lime.

Another limeworks was opened by Mr. Doherty in 1919 at Centre Bush and is still operating. As farmers found that liming paid opposition to the use of carbonate of lime was steadily overcome and works were opened up at Lady Barkly, Forest Hill, Fernhill, and Dipton, and another at Limehills.

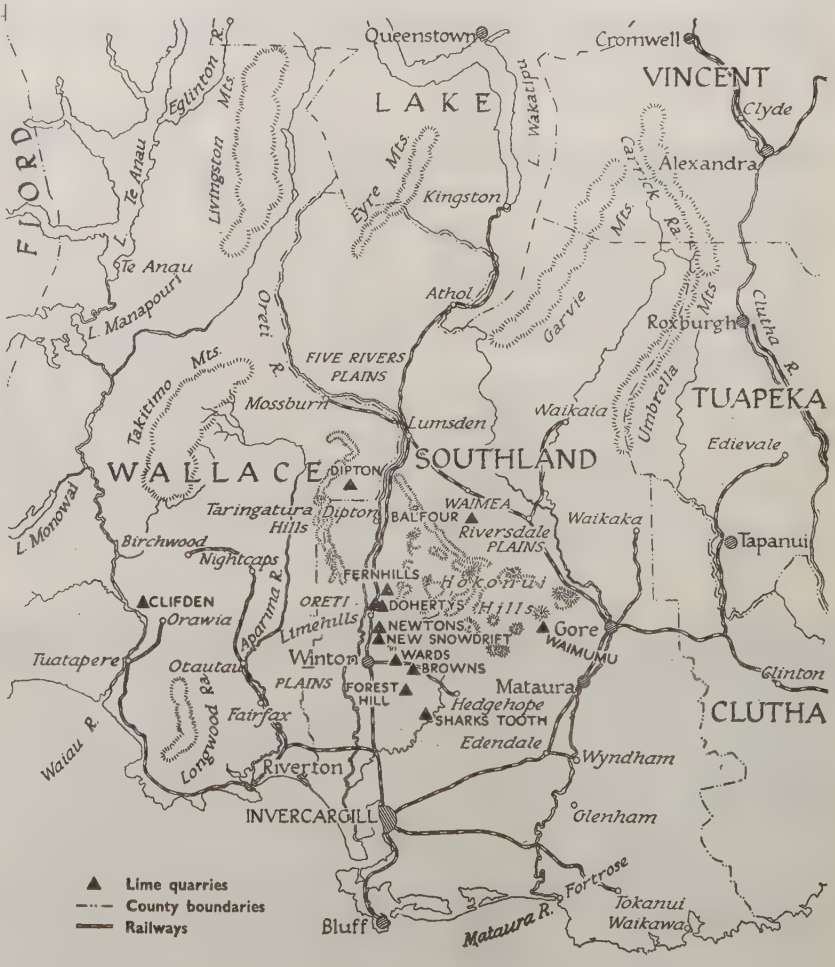
Land Classes and Lime Requirements

Southland soils may be divided conveniently into two major classes, which correspond to a great extent with the topography of the farming land. In the river valleys is an alluvial deposit, which in the higher reaches of the rivers is light and shingly and on the lower levels and toward the coastal area is a rich, deep, sandy loam. The second soil is a silt loam, which occurs on most of the rolling country. The texture of this loam varies considerably, from a medium, fairly free-working soil to a very moisture-retentive type with a greater admixture of clay. The subsoil of the rolling country is generally compacted and can be mole drained successfully. Irrespective of their texture Southland soils all show response to liming.

The silt loams of the rolling country, particularly those which are moisture retaining, generally require more lime than do the alluvial soils of the river valleys. On rolling country an application of 2½ to 4½ tons of carbonate of lime per acre from time of breaking up to sowing down has been found not only advantageous but necessary if best results are to be obtained from the sown pastures.

Improvement of Downs Country

An example of the improvement that has been made, and where this improvement has been closely linked with the use of lime, is a fairly extensive area of downs country of the Waimumu-Te Tipua district. This area is bounded on the east by the terrace of the Mataura River valley between Gore and Edendale and on the west by the Hokonui Hills. The soil is fairly light silt loam overlying a very



Queenstown
Cromwell
VINCENT
Clyde
Alexandra
LAKE
L. Wakatipu
Eglinton R.
Livingston Mts.
FIORD
L. Te Anau
Te Anau
L. Manapouri
Eyre Mts.
Kingston
Garvie Mts.
Carrick Ra.
Athol
Oreti R.
FIVE RIVERS PLAINS
Roxburgh
Clutha R.
Umbrella Mts.
Takitimo Mts.
Mossburn
Lumsden
Waikaia
TUAPEKA
Edievale
WALLACE
DIPTON
SOUTHLAND
L. Monowai
Taringatura Hills
Dipton
WAIMEA
BALFOUR
Riversdale PLAINS
Waikaka
Tapanui
Birchwood
Nightcaps
FERNHILLS
Hokonui Hills
CLIFDEN
Orawia
ORETI
DOHERTYS
Limehills
NEWTONS
NEW SNOWDRIFT
Gore
WAIMUMU
Aparima R.
Winton
WARDS
BROWNS
Tuatapere
Otautau
PLAINS
FOREST HILL
Mataura
Clinton
Hedgehope
SHARKS TOOTH
CLUTHA
Waiau R.
Longwood Ra.
Fairfax
Edendale
Wyndham
Riverton
INVERCARGILL
Glenham
Lime quarries
County boundaries
Railways
Fortrose
Tokanui
Waikawa
Bluff
Mataura R.

Map showing lime quarries in Southland.

moisture-retentive subsoil; the original cover was red tussock.

In the early days this land was held in extensive blocks and was used for the grazing of black poll cattle. After the land had been subdivided the tussock was ploughed and sown in turnips, and this crop was followed by ryegrass for seed. Ryegrass usually did exceedingly well, yields of seed were heavy (50 bushels per acre was not uncommon), and the seed harvested was generally very clean; it sold at about 2s. 6d. to 3s. per bushel ex mill. As there was no clover bottom, the ryegrass quickly "went out" and was replaced by a vigorous growth of browntop, seed from which then became a source of income.

Farmers found that with application of lime white clover growth was greatly stimulated and consequently pastures lasted longer, which permitted an increase in the sheep-carrying capacity of the farms. More lime was applied, topdressing with artificial fertiliser and more lime followed, and carrying capacity was steadily built up until much of this land which was clothed in red tussock only a comparatively few years ago is now carrying between 2 and 3 ewes per acre.

A 400-acre farm in this district, where more than 3000 tons of lime were used in about 14 years, may be quoted as an example of the progress made. The lime was applied at the rate of 4½ tons per acre during the first 3 years (2½ tons per acre on the first furrow and a further 1 ton per acre in each of the following two seasons). Pasture was sown down during the final year and thereafter it was topdressed with 1 bag of superphosphate and 5cwt. of lime per acre each year.

The farm, which was taken over in 1935, was carrying about 350 sheep and was dominantly browntop and red tussock. At present the 400 acres and the original homestead block, also of 400 acres, are carrying more than 2500 ewes, approximately 700 ewe hoggets, and about 80 head of cattle. All lambs other than ewe lambs kept for flock replacements are fattened, usually about 3000 per year.

The rolling country was brought in out of red tussock.

Development in Wendonside District

Another example where lime has played an important part in development is a farm in the Wendonside district. The soil on this farm, in contrast to that of the Waimumu farm quoted, is light, shingly terrace land. The farm of 960 acres was taken over in 1928 in a badly run-out condition; 300 acres had been extensively cropped and sown out in chewings fescue and the remainder was tussock.

In the first year 200 ewes were purchased, but as the farm would not carry them, they were sold. A bare living was made from chewings fescue seed and the sale of summer grazing. In 1936 a plan of improvement was put into effect. Blocks were ploughed and fallowed for 1 year. One ton of carbonate of lime was then applied before sowing swedes and a further ton per acre before sowing grain the next season. The next year pasture was sown out and another ton of lime per acre applied; the pasture land has since been topdressed every second year with 8cwt. of lime and 2cwt. of superphosphate per acre. At present the farm is carrying 1500 ewes and 600 dry sheep and is producing good crops of white clover seed.

Lime is essential in establishing high-producing pastures.

The two farms quoted are examples only of Southland farm practice. Similar though perhaps less spectacular results have been achieved by most Southland farmers from the use of lime.

The lime requirement of the alluvial soils is not generally as high as is that of the downs country, and applications of 1 to 1½ tons of lime on the first furrow, followed by a further ton at sowing down, is usually sufficient for the terrace land and the river flats.

Over-liming

The question of over-liming, particularly on farms situated within certain areas of the Southland Plain and on farms where the sheep concentration is between 4 and 5 ewes per acre, has been raised recently. The build-up in carrying capacity has been brought about by application of lime, plus improvement in pastures and topdressing, linked with a system of pasture management based on set stocking of paddocks from lambing time to weaning. Soil samples from some of these farms have been analysed and analyses have in many instances shown that, though the soils have not been overlimed, further application of lime is not necessary at present and the build-up in lime status may be affecting the balance of other minerals in relation to the lime present. Recent experimental work at Invermay Agricultural Research Station (Taieri) and at South Hillend indicate that applications of 2½oz. of sodium molybdate give responses in line with those which have been obtained from heavy dressings of lime, and further work is being undertaken to investigate the relationship of heavy liming and molybdenum deficiency.

Arable Land

The breaking up of lea land for swedes for winter feed is necessary, as club root is one of the problems of Southland. To minimise the likelihood or severity of club root attack lea is ploughed and a dressing of 1 ton of carbonate of lime per acre (or on some farms 1 ton of burnt lime per acre if this can be procured) is applied, usually just before the final discing. Some farmers make the lime application early in the cultivation, thereby giving the lime more time to take effect before ridging of the swedes. Others contend that if lime is applied early, it is worked down into the soil and the benefit from it is lost; but

Lime is applied to the cultivated land.

where there is risk of the development of club root the early application of lime is advocated. When swedes are sown the fertiliser used is either a mixture containing a percentage of lime, superphosphate and lime in equal quantities, or reverted superphosphate. Usually the next crop is grain; if, however, a second brassica crop is taken instead of grain or if brassicas follow grain, a further application of 1 ton of lime per acre may be made, and at sowing down almost all farmers apply 1 ton of carbonate of lime per acre.

Pastures

The introduction of improved strains of grasses and clovers has had a direct bearing on the increased use of lime on pasture land; and, conversely, the steadily increasing quantity of lime being applied is influencing the quantity of Certified seed being used. Southland farmers have learned that if the best results are to be obtained from the use of Certified grass seed for pasture mixtures, it is essential to have a vigorous white clover growth. The use of lime is a basic factor in obtaining this necessary clover growth and thereby starting the cycle of building up fertility and consequent high production per acre. Lime is therefore also applied in conjunction with topdressing (see Table 6).

TABLE 6—ACREAGE OF GRASSLANDS TOPDRESSED WITH LIME

Year	With lime only acres	With lime and fertilisers
*1928–29	77,548	30,222 tons
1938–39	46,534	194,067 acres
1948–49	128,052	227,941 acres

* In 1928–29 agricultural and pastoral statistics enumerated only under the single heading of area topdressed with lime.

Lime Supplies

There are 13 lime quarries in Southland, and 11 of these are in western Southland. Until a works was opened in the Balfour district in 1935 all lime for eastern Southland (except that coming from Otago works) had to be railed from the west.

The opening of the Balfour works had the full support of the farmers in the district, and this handy source has had a very significant influence on the development of farms throughout eastern Southland. There is another small works in eastern Southland at Waimumu, near Gore.

To assist in maintaining the quality of the lime that is sent to farmers official samples are drawn from each works at regular intervals. These samples are analysed for lime content and tested for fineness of grinding. The present cost of lime in Southland is 19s. per ton ex works.

Transport and Distribution

Improved facilities for transport and distribution are other factors which have had a great influence on increased use of lime in Southland. Southland is well served with rail transport, but the fact that 8 of the limeworks are fairly close to one another tends to create a bottleneck, particularly at periods of peak demand.

Free railage on lime was abolished in 1947 and was replaced by a lime transport subsidy whereby the farmer was required to pay the full railage for the first 15 miles and was thereafter entitled to a 50 per cent. subsidy on railage. At the same time a subsidy on transport of lime by road was introduced under which the farmer received 4d. per ton per mile after the first 3 miles. A revision in 1949 increased the rail subsidy to 75 per cent. after the first 15 miles and that on road haulage from 4d. to 6d. per ton per mile for parts of long road hauls.

Because of the subsidy on road transport, the proportion of the total output of Southland limeworks that was conveyed by rail has dropped very substantially during the last few years; for example, in 1946 just over two-thirds went by rail, but for the first 5 months of 1950 under one third was railed.

With lorry transport and a heavy truck fitted with a lime-sowing attachment 70 acres per day can be limed, using bagged lime, at the rate of 1 ton per acre, if the supply of lime is kept up to the spreader. Even if both carting and spreading are done by one lorry, it is possible for 3 men to cart and spread 30 tons of lime per day where the distance from source to paddock is 7 miles and an 8-ton load is taken at each trip.

In recent years rapid progress has been made in Southland with bulk spreading. The use of specially designed vehicles eliminates the need for bagging and these units, which are loaded in a few minutes at the works, can each cart 20 miles and spread 40 tons per day; on short hauls 100 tons per day can be exceeded. There is no handling and only a lorry driver is required. The cost of spreading is between 3s. 6d. and 4s. per ton per acre on grassland and 5s. per ton per acre on ploughed land. These vehicles can handle dried and undried lime, but damp lime tends to pack down hard during a long haul.

Future Trends

The peak periods of demand for lime are between October and December, when most of the crop and pastures are sown, and in May when lime is required for pasture topdressing. Production at the works must be carried on throughout the year; bin storage at the limeworks is limited and it is necessary therefore to devise means of securing more uniform production and distribution, thus lowering per ton production costs and making better use of road and rail transport.

Stockpiling of lime has been tried successfully in parts of the North and South Islands, but has not been attempted on an extensive scale in Southland. Small stockpiles of dried lime have been made and the material has been spread successfully, a bulk-lime spreader with spinner distributor being used, even after being subjected to periods of wet weather. The development of stockpiling of undried lime in Southland depends on the suitability of the material for this purpose; a prerequisite for successful stockpiling is suitable lime and equipment. Most limes apparently can be stockpiled satisfactorily. The exception is material containing clay-like impurities, which become sticky and unmanageable when wet.

If stockpiling of Southland lime proves practicable, the cost of drying it (about 3s. per ton) would be eliminated and the problem of distribution throughout the year would be solved, but there are technical difficulties to overcome. Some of the works have been experimenting with stockpiling of undried lime; the chief difficulty is satisfactory pulverising and screening of this lime to conform with the fineness of grinding required. A further difficulty is that the organisation of most of the Southland works is such that the lime moves from the primary crusher to the drier and then in to the pulveriser, so that if the problems of pulverising and screening of undried lime are solved, extensive alterations will be required at these works to facilitate the production and loading of undried lime.

Though there have been great increases in the quantity of lime produced and used and though much of the flat and undulating country in Southland is now being adequately limed, there are still considerable areas to be brought up to the highest production. In these districts, generally the more hilly parts, there are areas with a high potential production. All Southland soils have benefited by liming in the past, and these "back-block" areas will also require adequate applications before their production can be raised substantially. The development of stockpiling and bulk sowing will probably play an important part in bringing this land up to the standard necessary for maximum production from it.

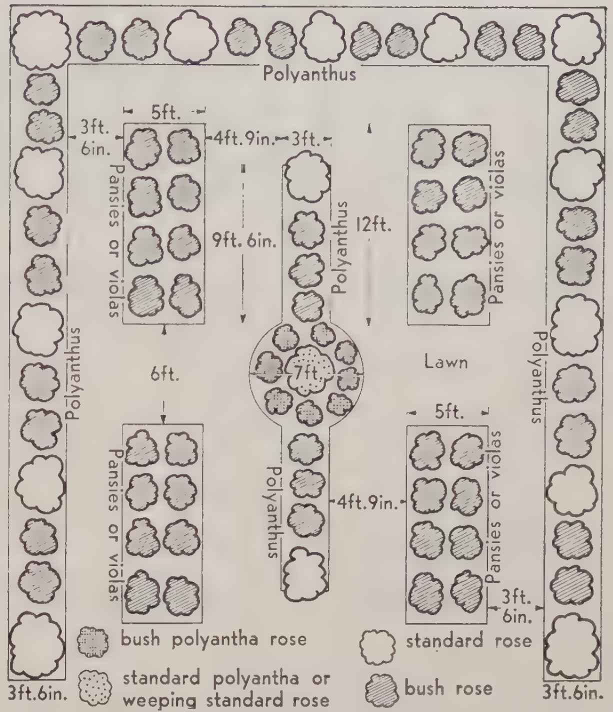
Acknowledgments

Thanks are expressed to Mr. J. McDonald, Otikerama, Mr. J. Doherty, Winton, and to lime companies and mercantile firms for their assistance in supplying information, and to the Southland Frozen Meat and Produce Export Company Ltd. for the figures in Table 5.

Establishing and Maintaining a Rose Garden

PERHAPS since the first days of gardening for decoration and beauty the rose has occupied a position of high regard. Few gardens today, whether long established or newly planted, do not exhibit at least a few bush or standard roses in beds or borders or a climber against a wall or trellis. Yet often for one reason or another a rose has failed where it should have succeeded. A complete study of roses and their culture is a long and comprehensive work, so in this article C. K. Ellis, Horticulturist, Department of Agriculture, Dunedin, discusses briefly the problems attending the establishment and maintenance of a rose garden on a comparatively small scale.

A PRIMARY consideration in rose growing is the site. If the gardener is not much restricted in his choice, he should select a site which is away from tall trees and as far as possible unshaded. However, choice is usually limited, and he must make the best of the space available and choose a site which most nearly approaches the ideal. Surprisingly fine results are often obtained even in a small bed bordering a pathway or road, provided the plants can receive full sunshine for at least half the day.



A plan for a small rose garden, approximately square, which could be fitted into many suburban sections.

Sunshine, Shelter, and Drainage

Exposure to sunshine is probably the most important consideration in the selection of a site. Few roses flower well without considerable bright sunshine, and if the circulation of air is interrupted, or is restricted to a great degree, trouble with mildew and other such fungous diseases may occur.

Protection from wind is best afforded by walls or hedges on the sides whence prevailing winds blow. Hedges of such types as lonicera, olearia, and privet are suitable, but better for the purpose would be a hedge of sweet brier. Such a hedge reserves the rose garden for the roses, and the scent which it yields on a summer evening adds immeasurable pleasure to work among the bushes. However, briers are gross feeders, and when they are planted closely enough to form a hedge the beds of roses must be well separated from them either by a wide space or by some method designed to prevent the wide spread of brier roots among those of the rose bushes. One method is to insert at the edges of the beds either planks of wood treated with some preservative or, if obtainable, concrete or sheets of galvanised iron.

As with most cultivated plants, good drainage is essential for roses. Frequently their failure has been traced back to the presence of stagnant water about the roots.

Soils

In almost all cases the basic soil, even if it is poor, must remain, chiefly because of the prohibitive cost of importing a more desirable type. However, roses will survive in a very wide range of soils, and good management will almost certainly ensure good growth and good flowering, almost regardless of the initial difficulties.

Only careful preparation will give good results if the soil is gravelly, clayey, or chalky.

Light, friable soils warm more quickly than heavy soils under spring sunshine, and in autumn they cool more rapidly.

Growth will continue later into autumn on heavy clayish soils than on the lighter ones, and the average winter temperature of the heavy type is slightly higher. This is in part because the clayish soils retain more moisture during winter and evaporation of this water under spring sunshine and winds tends to keep the soil temperature down. This can be checked to a certain extent by the use of shelter or by one of the usual mulching methods.

Manuring and regular mulching with some moisture-retaining mixture, especially during the flowering season, do much to improve the value of light soils.

Teas, chinas, rugosas, and many wichuraianas are most successful on a light, rather gritty soil. The hybrid teas, hybrid perpetuals, and briers are best grown on a soil of heavy and retentive character.

Beds and Borders

The sizes and shapes of beds and borders are important, as the gardener must be able to get at the plants from either side. A bed 5ft. wide will allow two rows of bushes, each 1ft. from the edge of the bed and separated from the other by a 3ft. space. Three rows may be planted in a bed 6ft. wide if the bushes in the centre row are placed diagonally between those of the outer rows, but this width is the maximum for convenience of working.

Beds 6ft. by 10ft. each containing a single variety, or perhaps borders of greater length with each group of one variety separated from the next by a single standard, are recommended, but such a "group planting" layout would seldom be possible in the average suburban garden. The final planning may be left to the judgment of the gardener and, if he adheres as far as possible to the recommended sizes of beds, he has every chance of achieving a satisfactory layout.

Standard roses are an asset, but must be used with discretion. Planted singly they lend good effect, but when they are placed in groups their true value is lost to a large extent. For standard roses planted as single specimens plots should be a minimum of 12 sq. ft.

Preparation of the Soil

As good drainage is essential, some attention will have to be paid to this aspect unless the soil is porous and the natural drainage sharp. The usual methods of soil drainage are now widely known and understood.

If the soil is a heavy, retentive loam, it must be dug thoroughly and deeply, preferably by double digging, which keeps the existing topsoil at the top but breaks up the second spit thoroughly. Into each 6 sq. yds. of the bottom spit should be incorporated 1 bushel of well-rotted compost or manure and into the top spit 2 to 3 bushels to each 9 sq. yds. When digging is completed the surface should be dressed with slaked lime at 4oz. per square yard.

A heavy clay soil can be lightened either by digging into each spit some material such as wood ashes, compost, or sand or by liming. The surface of such soil is best exposed to frost for as long as possible to ensure crumbling.

Only FORDSON MAJOR

gives you this combination of advantages!

Features

Built by the organisation with the **longest tractor experience** in the world. That means more and better features—**more efficiency** on every power farming job.

Performance

Power plus for all farm work. Diesel develops 45 h.p.—petrol 36 h.p. Drawbar pull up to 5,300 lbs.

Value

By far the **lowest priced** tractor in its h.p. class. From £439 with deposit as low as £150 and convenient payments under the Confidential A.F.C. Purchase Plan.

Backed by New Zealand's **finest dealer service.**

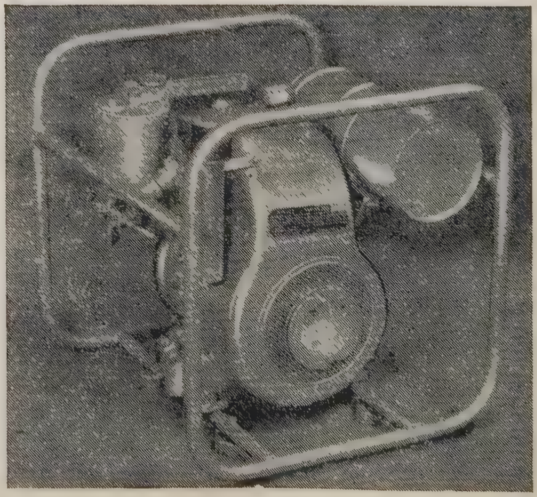
Point by point — Fordson Major is **the world's best tractor buy! Immediate delivery** from your nearest of the 80 Ford Dealers.

Get the facts . . . and you'll get Fordson Major

FORD MOTOR COMPANY OF NEW ZEALAND LIMITED LOWER HUTT

177

MY HANDY HALE *WILL SOON DOUSE THAT FIRE!*



HALE — *THE MODERN PORTABLE FIRE-FIGHTING UNIT.*

The Hale Centrifugal Fire Pump (powered by a "Briggs & Stratton") is simple, efficient and the ideal mobile fire unit for pumping water from awkward places. Special exhaust primer for quick priming. Maximum dependability . . . quality manufactured. Easily and quickly carried by two men. 150 gallons of water per minute for all emergencies. Canvas fire hose, branchpipes, fog nozzles, and suction hose also available. **Please send for fullest details.**

WHEN YOUR HALE IS NOT FIRE-FIGHTING

Use It For:—

- Irrigation
- Draining
- Sprinklers
- Emergency Water Supply
- Relaying water to larger pump.

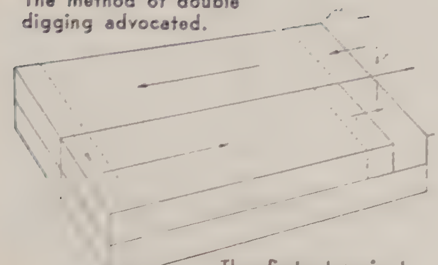
HALE

Brown Bros.
ENGINEERS LTD.

Pumping Machinery Specialists since 1908.

590 COLOMBO STREET. P.O. BOX 548J, CHRISTCHURCH.

The method of double digging advocated.



The first step is to open up the trench at the lower right. The arrows indicate the direction in which the soil is moved.

In sandy soils manures are better incorporated near the surface. A much more satisfactory procedure in such conditions is: After the lower spit has been dug put in on top of it a thick layer of turf, grass side downward, and chop it up with a spade to pieces about the size of a clenched fist; as the top spit is replaced mix with it well-rotted manure or compost at the rate of 4 bushels to each 8 sq. yds. of surface. On this type of soil an annual topdressing of well-rotted manure, 1 bushel to each 8 sq. yds., is usually necessary. The lime dressing of 4oz. per square yard is also needed and recent experimental work has shown that it may be applied at the same time as stable manure.

Selecting the Plants

In countless cases the gardener selects his roses from nurserymen's descriptions or from illustrations in books on the subject. That is far from satisfactory. Infinitely better is a visit to a botanical garden or nurseryman's garden where roses are a specialty to see the plants in bloom before the choice is made. Such a procedure allows the gardener to see the true colours, the growth characteristics (that is, whether the variety is a strong or a weak grower), and other small points which could not be appreciated from photographs or written descriptions.

A good bush rose should have about four strong roots, a mass of fibrous roots, and four or five vigorous stems.

A climbing rose should have roots similar to those of the bushes and about four strong stems.

The ramblers, wichuraianas, and climbing polyantha types (grouped into one class for convenience) are the most satisfactory roses for quickly covering arches, pergolas, and tall trellises. Each should have a strong root system, and long, vigorous stems.

Climbers or ramblers budded on to long brier stems produce the weeping standards, a very useful group of roses suitable for specimens or for bed centres. As with all standard roses, the brier stem should be straight and strong, the union at the top strong, and the root system good.

Good plants are a good start, and buying cheap but inferior-quality stock may result in having to replace several plants the next planting season.

Planting

Roses are often received some weeks before the best time for planting, particularly in the south when the soil is still wet and cold. When ordering plants it is wise to indicate the approximate date when they are wanted to obviate the necessity for heeling in the roses because of unfavourable conditions at the time of arrival. Should the order arrive during an unfavourable period, the gardener would be well advised to mound soil around the plants in a sheltered position and perhaps cover them with straw to prevent frost damage while awaiting better conditions for planting them out in the permanent site.

Rose plants benefit from being stood in a bucket of water for an hour or so before they are planted or heeled in. Before planting them in the permanent site the gardener should shorten any exceptionally long roots, remove damaged roots or stems and any leaves or seed pods, and cover the roots to prevent drying by wind or sun. Only one plant at a time should be removed from the cover.

The hole for each plant should be dug large enough to take the roots fully outspread and deep enough (probably not more than 6in.) to allow the point of bud union to be about an inch below the surface of the soil when filling is completed.

Planting should be done in a series of steps, none of which can be eliminated if the operation is to be wholly successful. First, place the plant in the hole and distribute the roots as evenly as possible around it. Sprinkle a light covering of soil over the roots, add a handful of bonedust or bone meal, and cover that with a further 3in. of soil. Then tread the lot firmly down about the plant. Continue filling and treading until bed level has been reached.

The most important factor in rose growing is firm planting, not, as has been popularly believed, clay soil.

When planting a standard rose, and whenever else a stake is necessary, drive the stake into position in the hole before the plant is placed, thus avoiding root damage caused by driving it in later. Do not tie the plant firmly until it has finally settled into place, a loose tie being sufficient to hold it temporarily. Standard roses should be planted a little deeper than bush roses.

Climbing roses should be placed at least 6in. from the structure that is to support them, each in a carefully prepared site about 18in. square. They are gross feeders and respond to a plentiful supply of well-rotted manure and a handful of bonedust in the upper soil. These recommendations apply equally to ramblers except that the shoots are shortened to half their length after they have been planted.

Polyantha roses should be treated in the same way as bush roses. Should the soil about the plants sink a little after planting, fill in the depressions to avoid accumulation of water about the roots. Frost is likely to loosen the plants in the soil, and during the first season after planting a close watch should be kept for such an occurrence and any necessary firming down done.

Growing other plants between the roses is not advisable, the principal objection being that cultivation is made difficult. However, an edging of polyanthus, pansies, or violas does not hinder cultivation greatly and certainly adds beauty to the rose garden.

Transplanting

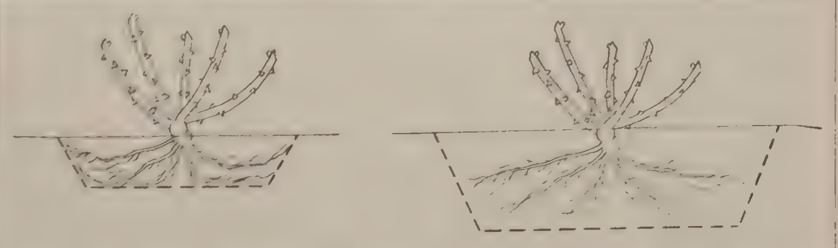
Should the initial layout prove unsatisfactory, or should some of the plants begin to look sickly after a few seasons, transplanting may become necessary. Exactly the same rules apply to this process as to the original planting.

When a rose needs transplanting it should be pruned hard, both stem and root, and planted firmly. The root pruning consists of removing most of the older knotted or damaged roots, thus promoting the growth of younger and more vigorous ones. Some enthusiasts make this an annual practice with many of the weaker-growing varieties and claim that the treatment imparts a vigour never acquired when the plants are left permanently in the ground. However, the benefits are somewhat doubtful with old or debilitated bushes and the purchase of new stock for planting may be preferable.

Pruning

Roses are pruned in accordance with the purpose for which they are grown, and the most usual purpose is garden decoration. Roses grown for exhibition where fewer and finer blooms are required need a modified form of pruning to reduce the number of buds that will produce shoots in spring, thus reducing the possible number of flowers. However, the advice given in this article will be restricted to the pruning of roses for garden decoration, for once the gardener has established his roses he will learn by experience how he can best achieve his aim, whatever it may be.

Though opinion is now tending to favour the lighter type of pruning, it is nevertheless true that the harder is the pruning the stronger will be the new growth. This rule does not apply to pernettianas, which will not tolerate hard pruning, and continuous hard pruning of other types of roses often results in loss of vigour.



Left—A rose planted wrongly. The point of bud union is exposed and insufficient space has been left for the roots to be spread properly. Right—A rose planted correctly. The point of bud union is well below the soil surface and ample space has been left for the roots to be spread.

SCRUB & WEED CONTROL . . .

at LOWER COST

Stantox T.45 gets rid of scrub, quickly, *more* efficiently and *more* economically . . . just spray it on and watch results. And use Stantox T.45 on extra-difficult-to-kill weeds.

4785-4

Stantox

BEST BY TEST T-45

Sole N.Z. Agents

J. H. BARBOUR & SON LTD.

86 Wakefield Street, Wellington.

DAY AND NIGHT

RAILWAY WAGONS MUST WORK

Day and night the railways are performing the major part in the Dominion's transport task. National prosperity depends upon efficient economical transportation and in order to meet the ever-increasing demands upon their services, the railways are modernising and strengthening their equipment as rapidly as the present world conditions will permit. Meanwhile, every available wagon and tarpaulin must be worked to full capacity. Rail users are urged to speed loading and unloading.

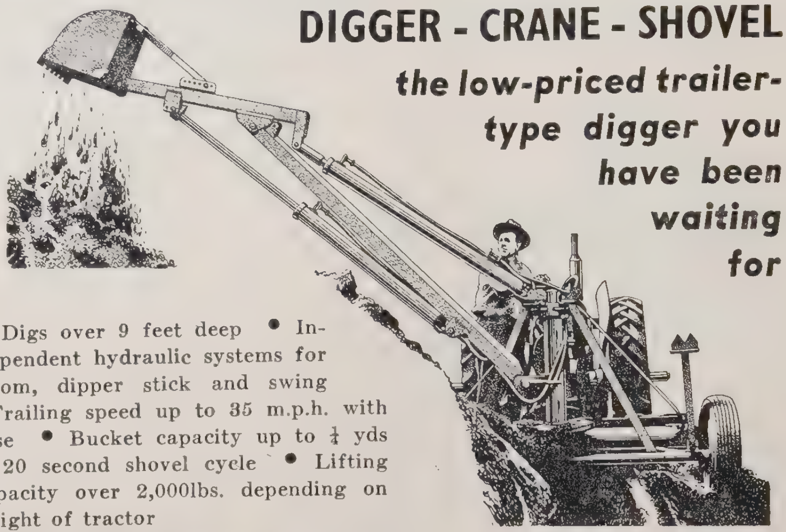
EVERY WAGON-HOUR COUNTS

HOPTO

HYDRAULICALLY OPERATED POWER TAKE OFF

DIGGER - CRANE - SHOVEL

the low-priced trailer-type digger you have been waiting for



- Digs over 9 feet deep
- Independent hydraulic systems for boom, dipper stick and swing
- Trailing speed up to 35 m.p.h. with ease
- Bucket capacity up to ¼ yds
- 20 second shovel cycle
- Lifting capacity over 2,000lbs. depending on weight of tractor

Enquire today from the nearest branch of

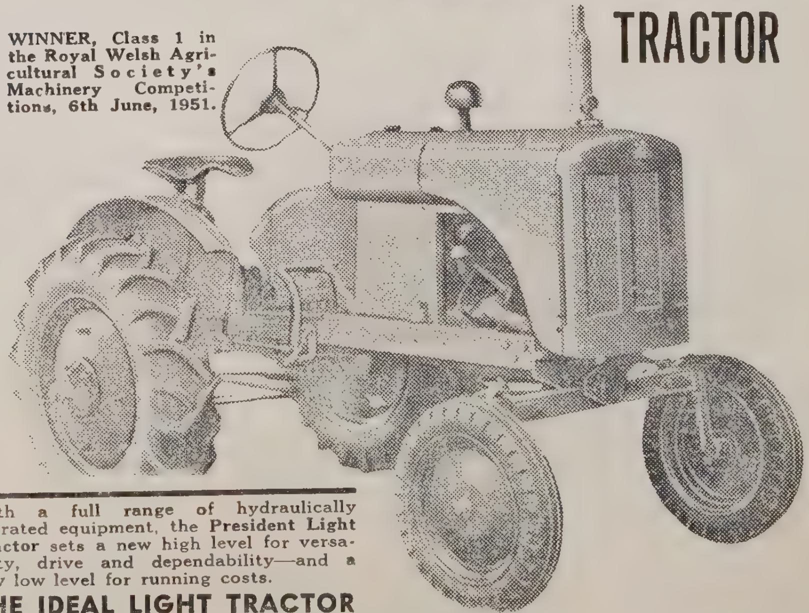
DORING IMPLEMENT SUPPLIES LTD.

P.O. Box 1179, Wellington—P.O. Box 548, Palmerston North—P.O. Box 632, Hamilton—P.O. Box 1203, Christchurch—P.O. Box 99, Gore.

SLASH FARMING COSTS WITH THE NEW BRITISH

B·M·B PRESIDENT TRACTOR

WINNER, Class 1 in the Royal Welsh Agricultural Society's Machinery Competitions, 6th June, 1951.



With a full range of hydraulically operated equipment, the **President Light Tractor** sets a new high level for versatility, drive and dependability—and a new low level for running costs.

THE IDEAL LIGHT TRACTOR

Dealers in all Main Centres.

N.Z. Distributors: AGRICULTURAL CULTIVATORS (N.Z.) LTD., P.O. Box 1102, Auckland.

The time for pruning depends on local conditions. The usual time is late July in most districts and August in the colder areas. The correct tool is a pair of sharp secateurs. Good protective gloves save many minor wounds to the hands.

There are two definite stages in pruning a rose: First is the removal of all dead, weak, unripe, or unwanted shoots, and second the shortening of all remaining shoots to encourage the production of young and vigorous growth. The removal of dead wood is most important, for it reduces the incidence of such troubles as die-back and other fungous diseases. Every cut should be made above a bud in the manner shown in the diagram on this page.

A good plan is to group the roses according to their vigour and prune on the assumption that the severity of the cutting back controls the vigour of the growth which will follow. The strong growers will be pruned only lightly, the medium growers a little more severely, and the weak growers most severely.

Whether to cut to an outside bud or an inside bud cannot be stated, for the grower alone knows the shape he desires in his plants. The only advice that can be given is to cut to the bud which will produce a shoot growing in the most desirable direction to give a shapely plant at flowering time.

Most newly planted roses benefit from fairly hard pruning, only about three buds being left to each stem. However, some varieties such as Etoile de Hollande may not stand such treatment, and when buying the plants it is wise to inquire of the nurseryman which varieties should not be pruned severely. Climbing tea and hybrid tea roses are exceptions which should have only the tips of the stems removed during the first season after planting. Polyantha and hybrid polyantha should be left with at least 8in. of strong growth on each stem.

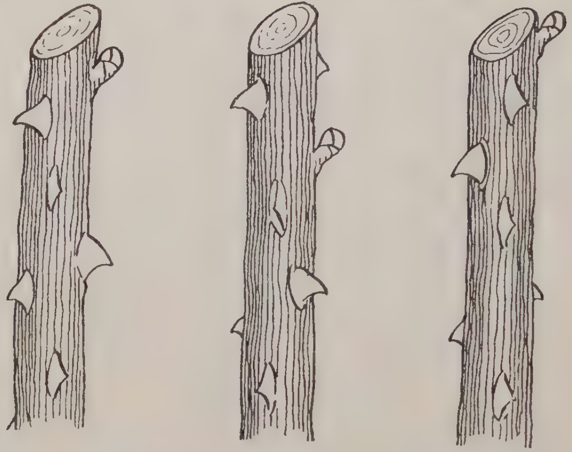
Manuring

Manurial requirements vary with the district and soil. On light soils annual dressings of manures are necessary, but on the heavier, more retentive soils applications may be less frequent.

On the whole, however, roses are gross-feeding plants and must have an abundant supply of nutrients at all times, but care must be taken that the plants are not overfed, as they often have been when an enthusiast adheres strictly to some unconditional instruction that he must make annual applications of manures. Soil and climate vary so greatly in New Zealand that this question can well be left to be decided from the experience to be gained in each garden.

[*Green and Hahn Photography Ltd. photos.*
A standard rose ready for pruning (above) and after being pruned (below).

[*Green and Hahn Photography Ltd. photos.*
Above—A bush rose ready for pruning. Below left—With all weak, old, unripe, or unnecessary wood removed, leaving only the more desirable shoots which are to be shortened back. Below right—After the final pruning.



Left—The correct cut with which to prune a rose. Middle—A cut made too far above the bud. Right—A cut made too close to the bud.

BANK of
NEW ZEALAND

"My Bank"

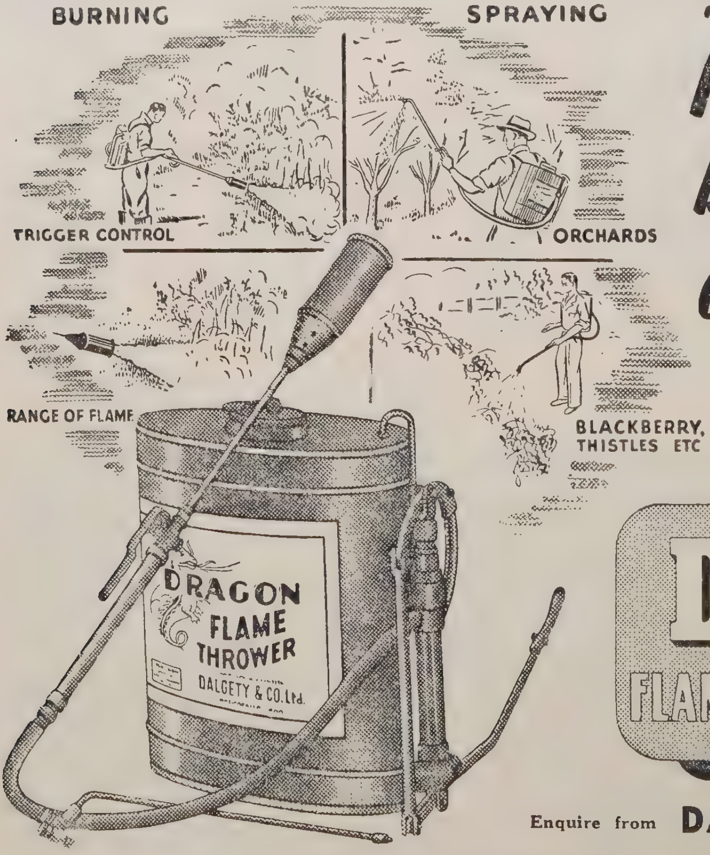
to thousands of Farmers

When the farmer says, "I'm calling on my bank" he more often than not means the Bank of New Zealand. As the largest banking business in the Dominion, the B.N.Z. offers the farmer unrivalled banking facilities with helpful counsel based on a sound knowledge of local conditions. Your enquiries are invited.

BANK OF NEW ZEALAND

More than 290 Branches and Agencies in the Dominion. Established 1861.

18.1C


BURNING
SPRAYING
TRIGGER CONTROL
ORCHARDS
RANGE OF FLAME
BLACKBERRY, THISTLES ETC
DRAGON
FLAME
THROWER
DALGETY & CO. Ltd.

"Makes controlled burning simple, easy, economical"

The "DRAGON" Flamethrower ensures a searing, scorching, flame and **continuous burning**, subject to trigger control. It is easily converted into a really powerful SPRAYER.

OVER 7,500 SOLD!

DRAGON
FLAMETHROWER & SPRAYER

Enquire from **DALGETY & CO. LTD.** ALL BRANCHES
(INC. IN ENG.)

PROPAGATION OF ROSES—215

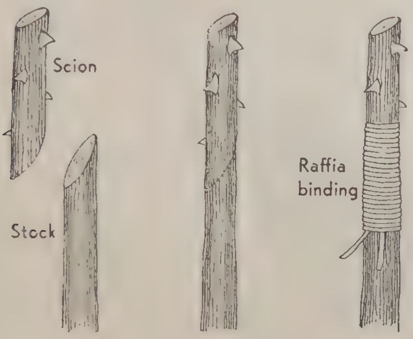
Roses, like most other plants, can be propagated from seed, grafts, buds, or cuttings.

Seed Raising

In practice seed raising is restricted mainly to persons concerned with hybridising roses and does not often enter into the home gardener's sphere of activities. It is the standard method of raising what are known as species roses, but as these are not included in the scope of this article propagation by seed will not be discussed.

Grafting

Grafting is usually carried out only for the production of special-purpose roses, mainly for glasshouse cultivation. During autumn brier stocks are potted in 4in. pots and stood outside in a position where they do not dry out. In April or May they are taken into the glasshouse for grafting. The scions should be no more than 2in. long and bear only one bud. The whip graft is the most common and usually the most successful method; the stock and scion must be of equal thickness and are cut with a sharp knife as shown in the diagram.



The method of whip grafting.

The grafts are kept in the glasshouse at 55 to 60 degrees F. with fairly high humidity, and when growth has been made the ventilation of the house is increased and the plants grown on normally.

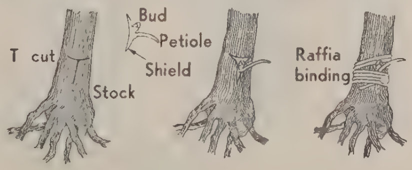
Budding

For budding, which is the principal commercial method of raising roses, *Rosa multiflora* is the stock most commonly used. Plants of this species can be grown without difficulty from hard-wood cuttings, the second method described under the next heading. Once good stock is established budding can be started.

For bush roses the head is left on the stock and the bud inserted on the main stem at about normal soil level. Soil is not placed over the bud until union is sure and growth has been produced. For standard roses straight stocks are selected and all side growths except the top two or three removed. *R. odorata* and *R. canina* may also be used for stock, and the only standard grown widely in New Zealand is the "full" or 3ft. 6in. type. The budding is done on the top growths as close as possible to the junctions of the top growths and the main stem. If *R. rugosa* stocks are used for standards, the buds are placed on the main stem rather than on the side shoots.

Budding is carried out when the bark strips freely from the wood—normally during late January and February. While the operation is in progress the bud wood is held upside down and a very sharp knife used to cut out the bud, beginning about an inch above the bud and finishing half an inch below it. The leaf is removed, but part of the petiole is left for convenience of handling. The wood lying inside the bark of the bud is removed, and the bud is then ready for insertion in a T cut made on the stock. The cross-cut of the top of the T is made first, then the down cut. The bark is lifted back carefully from beside the down cut and the bud slid in from the top. The fit should be neat and firm.

[*Department of Internal Affairs photo.*
Rose Betty Uprichard grown from a cutting.



The method of budding a rose plant.

The area is bound with raffia so that the lips of the down-cut of the T lie flat against the shield of the bud. When the bud has taken—about a fortnight later—the raffia should be cut to prevent strangulation. The stock growth is not removed until all growth for the season has ceased, when it is taken away by a clean cut about an inch above the bud union. The raffia is also removed at this stage.

Cuttings

Of all the vegetative methods of propagation the simplest and most common among home gardeners is growing from cuttings of the stem. This may be done in two distinct ways.

About December 6in. pieces of stems which have flowered are taken from the parent and most of the lower leaves removed. These cuttings are inserted to half their length in sandy soil in a 5in. or 6in. pot and well watered. Given the shelter of a frame or glasshouse and sufficient but not too much water, such cuttings should produce roots in 3 to 4 weeks. When well rooted the cuttings may be potted into 5in. pots and hardened off in preparation for planting out.

The second method is to take hard-wood cuttings about 9in. long in late autumn or early winter. A narrow, straight-backed trench 5in. deep is dug in a sheltered position and an inch-deep layer of sharp sand placed at the bottom. The cuttings are set against the back with their bases in the sand and the trench filled and trodden firmly. Rooting should take place at about the time growth begins in spring, but the resulting plants should not be moved until the following planting season, when they may be set out in their permanent positions. This method takes longer to give results, but is even simpler than the first.

Diseases and Pests

The control of diseases and pests is of paramount importance in rose growing, for good results cannot be achieved with infected plants. The small effort required to keep the plants clean is well rewarded in strength and vigour of foliage and perfection of bloom. Many diseases and pests affect roses in New Zealand, the most serious and most common of the fungous diseases being black spot and mildew.

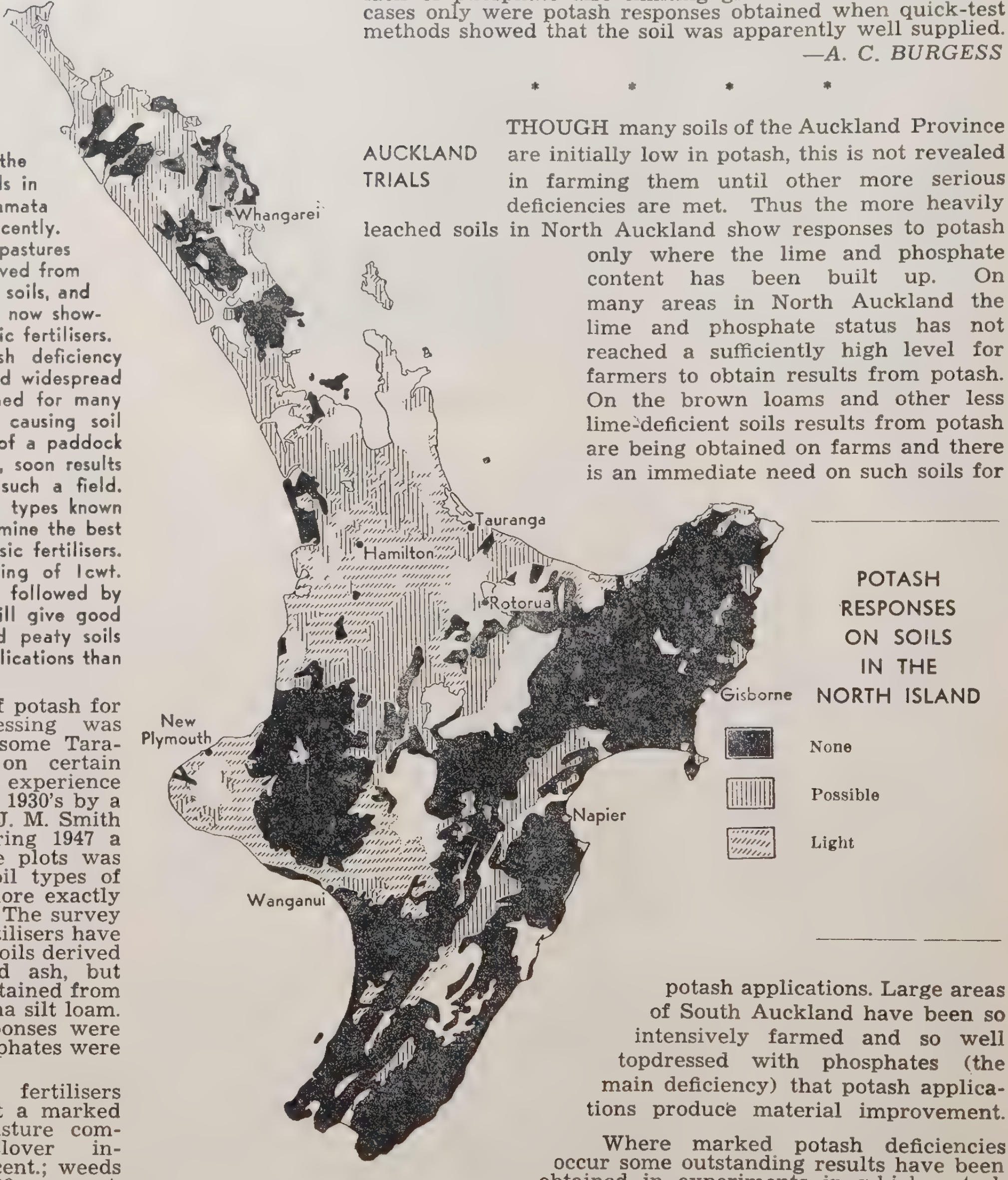
Black spot usually appears in early summer, the first indication of its presence being purple-brown spots on the mature leaves. Defoliation may follow heavy infection, and if this happens, all fallen leaves must be gathered and burnt, as the spores over-winter in the soil, and a dressing of 8oz. of slaked lime per square yard applied to the soil surface about June. During July the dormant plants should be given a spray of Bordeaux mixture 1 : 1 : 10, repeated about 3 weeks later if growth has not begun. Spraying may also be carried out while the foliage is on the plants with a mixture of 1½ tablespoons of lime sulphur to 1 gallon of water. The developmental cycle of the fungus occupies about 14 days, so spraying should be repeated every 10 days until the disease has disappeared.

Mildew is probably the most common disease of roses. Whitish spots on the leaves are the first indication of its presence, these spreading rapidly until they cover the whole of each leaf and finally the young shoots, resulting in loss of vigour and bloom. Some rose varieties are almost immune from attack by mildew, but most of the softer, quick-growing types are very susceptible. Correct pruning, which keeps the plants open to the circulation of air, does much to prevent infection. The lime sulphur spray, used in the same way as for black spot, is effective as a controllant, as are many proprietary mixtures.

The rose aphis (*Macrosiphum rosae*) is undoubtedly the most important of the insect pests. This insect reproduces with amazing rapidity, so spraying must be carried out at regular intervals to eliminate it. Proprietary sprays with a nicotine sulphate base give excellent control, but spraying must be repeated at 10-day intervals to eliminate the young insects which are born while the older ones are dying as a result of earlier applications of the spray. This procedure should be followed while the plants show any sign of the pest.

Recent Research Work:

Potassic Fertilisers for Topdressing



AN INTENSIVE STUDY of the potash requirements of soils in Taranaki, Rotorua, and Matamata districts has been carried out recently. Experiments have shown that pastures on many North Island soils derived from volcanic ash, many of the sandy soils, and most peats and peaty soils are now showing definite responses to potassic fertilisers. There is evidence that potash deficiency often becomes more marked and widespread after the soils have been farmed for many years. Any farming practice causing soil depletion, such as the cutting of a paddock for hay for a number of years, soon results in a deficiency of potash on such a field. Work is in progress on the soil types known to be potash deficient to determine the best rates and times to apply potassic fertilisers. On most soils an initial dressing of 1cwt. per acre of muriate of potash followed by annual applications of ½cwt. will give good results, though most peats and peaty soils require considerably higher applications than this.

TARANAKI TRIALS

THE VALUE of potash for pasture topdressing was recognised by some Taranaki farmers on certain soils 30 years ago and their experience was confirmed in the early 1930's by a plot survey carried out by J. M. Smith and A. G. Elliott. In spring 1947 a series of half chain square plots was laid down on the main soil types of north Taranaki to define more exactly the potash deficient areas. The survey has shown that potassic fertilisers have had a marked effect on all soils derived from Egmont or Stratford ash, but little or no response was obtained from trials on the Whangamomona silt loam. On some trials potash responses were not evident until after phosphates were applied.

CLOVER RESPONSES

Potassic fertilisers brought about a marked change in pasture composition. Clover increased from 10 to 30 per cent.; weeds were reduced from 25 to 30 per cent. of the sward to 10 to 15 per cent. within a few months. The accompanying table shows the effect of one dressing of 1cwt. of muriate of potash on the clover content of the swards on the trial plots.

EFFECT OF POTASSIC FERTILISERS ON CLOVER CONTENT OF TARANAKI PASTURES

District	Soil type	Clover content No potash Per cent.	Clover content Potash Per cent.
Tataraimaka	*Egmont silt loam	10	25
Okato	New Plymouth silt loam	20	30
Pukearuhe	*New Plymouth silt loam	15	30
Lepperton	New Plymouth sandy loam	20	30
Inglewood	Stratford sandy loam	20	30
Inglewood	Inglewood coarse sandy loam	10	30
Carrington Road	Patua sandy loam	20	30

* Black phase

Not only were there marked clover increases on the potash-treated plots, but the swards kept greener and more vigorous and palatable at all seasons than untreated areas. Soil samples from 29 trials were examined by quick-test methods for available potash, and comparison of results with field responses showed a satisfactory measure of agreement. Certain anomalies were explicable through lack of phosphate also limiting growth. In two or three cases only were potash responses obtained when quick-test methods showed that the soil was apparently well supplied.

—*A. C. BURGESS*

* * * *

AUCKLAND TRIALS

THOUGH many soils of the Auckland Province are initially low in potash, this is not revealed in farming them until other more serious deficiencies are met. Thus the more heavily leached soils in North Auckland show responses to potash only where the lime and phosphate content has been built up. On many areas in North Auckland the lime and phosphate status has not reached a sufficiently high level for farmers to obtain results from potash. On the brown loams and other less lime-deficient soils results from potash are being obtained on farms and there is an immediate need on such soils for potash applications. Large areas of South Auckland have been so intensively farmed and so well topdressed with phosphates (the main deficiency) that potash applications produce material improvement.

Where marked potash deficiencies occur some outstanding results have been obtained in experiments in which potash fertilisers have been used. For example, on a peat soil in the Te Aroha district dressings of phosphate, of lime, and of various minor elements gave little or no response, but marked increases in pasture production were obtained from muriate of potash. On the plots receiving the heaviest dressing (12½cwt. of muriate of potash over 3 years) yields were nearly three times as great as on no-potash plots; on plots receiving the lightest dressing (2½cwt. of muriate of potash over 3 years) yields were about 60 per cent. above no-potash plots. At these rates of increase even the heaviest dressings of potash appear worth while. Most peat soils are extremely deficient in potash, and yield increases comparable with those mentioned are not usually found on the majority of mineral soils.

—*J. E. BELL*

Broad Beans

By A. G. KENNELLY, Vegetable Instructor, Department of Agriculture, Dunedin

[Sparrow Industrial Pictures Ltd. photo.

Broad beans are particularly useful for sowing in late autumn to harvest in late spring, when fresh vegetables are usually in short supply. Illustrated is a good crop of Long Pod broad beans.

THOUGH broad beans are less generally appreciated, perhaps because of their strong flavour, than dwarf or runner beans, they have a number of advantages over most other kinds of bean. They are easily grown, hardy, of fairly good food value, and can be grown to mature at a time when in most gardens fresh vegetables are in short supply and lacking in variety; in reasonably favourable conditions most varieties can be relied on to produce a good crop with very little attention.

THE broad bean (*Vicia faba* L.) is an annual belonging to a different genus from the runner or the dwarf bean and unlike them is hardy, making good growth in cool weather. It has been cultivated since very ancient times. A limiting factor in its culture is its intolerance of hot, dry conditions, and therefore main sowings are made in late autumn.

Soil, Manure, and Cultivation

Broad beans do not require special soil, but it is not advisable to sow them in light soil that tends to dry out. They do well in fairly heavy, moist, well-drained soils that have been thoroughly cultivated and into which has been worked, if the soil lacks organic matter, a moderate amount of material such as compost or well-rotted farmyard manure.

The principal plant nutrient required on most soils is phosphoric acid, which can be supplied by standard superphosphate mix or by bone manure, though on soils such as those in many home gardens that have been cultivated for many years without a balanced manurial programme being followed, a complete fertiliser containing nitrogen, phosphorus, and potash is likely to give best results. Apart from their nutrient value, phosphates have a stimulating effect on the nitrogen-fixing bacteria.

Broad beans require only a small amount of nitrogen. A mixture of 1 part of sulphate of ammonia, 4 parts of standard superphosphate mix, and 1 part of sulphate or muriate of potash, or alternatively 3 parts of blood and bone, 2 parts of standard superphosphate mix, and 1 part of sulphate or muriate of potash worked in at the rate of 2 to 3oz. to the square yard (commercially about 4 to 8cwt. to the acre), according to the fertility of the soil, will give good results on most soils that have been cultivated for many years. Standard superphosphate mix alone may give satisfactory results on new soils or soils that have been well dressed with balanced fertilisers for previous crops.

Though broad beans are tolerant of a fairly wide acid-alkaline range (pH), they will not thrive in excessively acid conditions, and in moderate or heavy-rainfall districts growth in most soils not recently limed will be improved by applying carbonate of lime at the rate of about 2 to 4oz. to the square yard (6 to about 12cwt. to the acre). It is best worked in some time before sowing.

Apart from weed control, beans should require little attention when young, but it is usually advisable in winter or early spring when the weather is boisterous to draw a little soil against the stems of autumn-sown plants to support them. In the home garden tall-growing varieties can be stopped when they are about 30 to 36in. high by pinching out the tops. This encourages the plant to develop sturdy growth and is often sufficient to check an attack of black aphis in its early stages, particularly if the aphides' natural enemies such as lacewing flies, ladybirds, and their larvae are numerous.

In many gardens where tall varieties are grown it is advisable to support the plants as they develop or as they become heavy with pods. One or more strings run along the sides of rows and tied to stakes at intervals of 5 or 6ft. will save the plants from being blown over.

Sowing

Beans sown early in autumn do not necessarily yield pods earlier than those sown in late autumn or early winter, for though the plants may make good growth in the late autumn and early winter, they are likely, particularly where winters are fairly severe, to be damaged and checked by disease or by boisterous weather. The earliest flowers often fail to set because they are produced at a time of unfavourable soil conditions and sudden extreme temperature changes. Spring sowing should not be delayed too long, as the crop is liable to be reduced if it matures in the hot, dry conditions of summer.

Broad beans are best set 2 to 3in. deep, preferably with a trowel, and 4 to 6in. apart in the bottom of a drill about 3in. deep in double rows 10 to 12in. apart, with each double row not less than 26in. apart. Commercially the seed can be dropped into a drill drawn or ploughed out about 4 to 5in. deep and the soil can then be worked back to cover it 2 to 3in. deep. Single rows are sometimes preferred; they should be 15 to 18in. apart. Germination is usually good, but in the home garden a few extra seed can be sown at the ends of rows and later transplanted for filling in gaps; the young plants should be transplanted as early as possible. Seed varies in size, but a little less than a quart of seed will sow about 50ft. of double row. About 2½ bushels are required to sow an acre. Germination can be speeded by soaking the seed for about 12 hours before sowing.

Types and Varieties

Two main types of broad bean are grown in New Zealand, the broad-podded or Windsor type and the long-podded type. The broad-podded type has relatively short, broad pods usually containing about 3 to 5 large seeds. It is represented by varieties such as Broad Windsor, Giant Windsor, and Harlington Windsor. Long Pod and Mammoth Long Pod are examples of the long-podded type, varieties of which may produce pods up to 16in. long, though usually they are about 5 to 9in. long and contain about 4 to 7 seeds. The Windsor type is usually considered to be of superior flavour, but the long-podded beans are hardier, yield more heavily, and are usually earlier.

Small-podded varieties are also sold by some seedsmen. They may be tall or dwarf. The tall varieties, for example Tall Magazan, are low yielding and are not recommended. Dwarf varieties, however, are well worth growing, particularly in small gardens or in exposed situations. They are also useful for sowing in January, where conditions are not too hot and dry (or even in February where the growing period is long enough), to mature before winter. They are mainly classed as fan-podded and may be from about 9 to 15in. high. The pods contain 2 to about 4 small seeds and are usually attached in fan form. The foliage is small, often fairly dark, and the internodes are very short. Examples of the type are Coles Early Dwarf and Dwarf Gem.

Broad beans are also grouped according to whether the seeds are white or green. Many consider that the green-seeded kinds are more tender and tasty than the white. There are green-seeded and white-seeded kinds in the Windsor, long-podded, and small-podded groups. Red-seeded varieties were once fairly common, but they are not now listed by seedsmen.

Harvesting and Marketing

In the home garden harvesting can be begun as soon as the first pods are half grown. Commercial growers usually start harvesting when the first pods are well filled but the seeds still soft. The crop should be gone over once or twice a week. Picking is easier if the plants are well spaced. Under favourable conditions the long-podded varieties can be expected to yield 2 to 2½ tons of mature pods to the acre.

Marketing practices vary somewhat according to local markets, but broad beans are commonly sold in apple boxes; sugar bags are also used, particularly where the produce has to travel long distances or to be railed. The market demand is usually limited and influenced by the supply of fresh peas, spring cabbage, and cauliflower.

Seed Saving

Because broad beans are usually grown to mature at a time favourable for seed-ripening outdoors, pods can be left to dry on the plants, though the crop is likely to be bigger, because the plants will thus be encouraged to continue bearing, if the pods are harvested as they mature (that is as soon as the spongy, felt-like down on the inside of the pod has disappeared). Allowing the pods to dry on the plant is simpler and most growers obtain sufficient seed for their needs by leaving only the last few pods to dry. Bean seed should be dried thoroughly and stored in airy, reasonably dry conditions such as obtain in well-constructed sheds or ventilated cellars. Seed remains viable for from 3 to 8 years according to storage conditions. If the pods are not dry at harvesting, they should be spread on open-mesh material in dry, airy conditions. When dry they should be shelled; most of the seed is then readily shed in handling. Only clean, unmarked seed should be kept for sowing. An acre of broad beans should yield about 12 to 15cwt. of seed.

To prevent infestation by weevils, clean seed can be stored in stout muslin bags or dusted with a 2 per cent. D.D.T. dust. D.D.T. dust will also protect slightly infested seed from further infestation. The dust should be mixed thoroughly with the seed at the rate of 2oz. to a bushel. Copper or mercury dusts, which are available as proprietary lines, will also prevent infestation if applied according to the manufacturers' directions. Copper or mercury dusts also give some protection to newly sown seed against soil-borne disease, though in that respect they are not as effective as an organic non-metallic fungicidal seed dust (tetrachloro-para-benzoquinone) sold in New Zealand under two different trade names and which has been certified by the Plant Diseases Division of the Department of Scientific and Industrial Research for the treatment of pea seed for the prevention of pre-emergence damping-off or seed rot.

The dusts mentioned are poisonous and should not be inhaled and the skin should be washed as soon as possible after contact with them.

It is not commonly known that the immature pods of broad beans are delicious and may be eaten whole if they are sliced in the way usually adopted for preparing runner beans for cooking; young broad beans are quite tasty used raw in salads if they are shelled and the seeds skinned. Skinning is not difficult and with the seed-coat removed the beans are sweet and tender.

Pests and Diseases

The following are pests and diseases which affect broad beans:—

Black Aphis

Black aphis (*Aphis rumicis*), commonly known to gardeners as black fly or plant lice, is a common pest of broad beans. Infestation is usually confined at first to the young, tender growth at the tops of plants, and spring-sown plants are affected worst, as the growth on them is usually more tender than that on plants that have over-wintered. If the plants are tall enough and the aphis is noticed while infestation is light, it can often be destroyed by pinching out the tender growth at the top of the plant. Aphis infestation can be controlled by either a H.E.T.P. (Hexaethyl tetraphosphate) or nicotine sulphate spray at a strength of 1 : 800 (1 fl. oz. to 5 gallons of water). To be fully effective nicotine sulphate spray requires an alkaline substance, such as soap dissolved in water, and should be applied on a hot, still day.

Chocolate Spot or Bean Blight

Broad beans have tender, easily damaged foliage which reacts by the development of reddish spots or stains to rubbing or similar superficial injury that may be caused by insect pests or diseases. Two parasitic fungi cause superficially similar chocolate-coloured spotting or "blight" on broad beans.

The commonest injury is caused by the fungous disease *Botrytis cinerea* Fr., which frequently attacks over-wintering broad beans. Where conditions favour it, botrytis may be very destructive and cause extensive spotting, blotching, or defoliation. The chocolate-coloured markings on the leaves, petioles, and stems of plants may be superficial or may penetrate some distance and are commonly found on plants that have been subjected to severe winter weather. Botrytis is a common cause of non-setting, as infected flowers usually rot and fall. Its spread is favoured by cool, moist weather. Phosphate and potash deficiency in the soil renders plants more subject to the disease, particularly if the crop is dense and aeration poor and if the soil is poorly drained. A Bordeaux spray at a strength of 3 : 4 : 50 is of value in combating the disease where it is likely to become epidemic. Spraying is rarely necessary, as the disease is largely influenced by weather conditions; as the weather improves the plants usually develop new, healthy growth and overcome most of the adverse effects of the disease.

The second type of spotting commonly called bean blight is due to the fungous disease *Ascochyta fabae* (Speg.). It is characterised by the spots having greyish centres and minute pustular fruiting bodies in the central area. Control consists of the use of clean seed, good drainage, long rotations, and the destruction of rubbish.

Frost may also cause reddish discoloration of the stem bases.

Rust

The fungous disease rust (*Uromyces fabae* (Pers.) *De Bary*) is characterised by small, dark brown, dusty raised spots (pustules) on the leaves, leaf stalks, and on the stems. On the leaves the spots are often characterised by a halo of slightly lighter green than the remainder of the leaf. The dusty appearance of the spots is due to the production of large numbers of spores of the fungus. Infection results, according to its severity, in reduced cropping, stunting, or, rarely, the death of plants. The disease is difficult to control, but its severity can be reduced by applying at 2- or 3-weekly intervals a spray made of 4 fl. oz. of lime sulphur, 1 fl. oz. of colloidal sulphur, and 4 gallons of water.

Sclerotinia Disease

Sclerotinia sclerotiorum (Lib) Mass. is a fungous disease characterised by the development of copious white fluffy mycelium and later of comparatively large black sclerotia or resting bodies, often inside the stems. The disease commonly attacks the main stems, usually near the base, causing them to rot and plants to wilt and die. Seriously affected plants should be removed and burnt; if they are left, the resting bodies which develop constitute a source of infection for subsequent crops. Crop rotation, good drainage, aeration, and hygiene are the most important factors in control of the disease.

Wilt Disease

Wilt (*Fusarium* sp.) may cause yellowing of the leaves and wilting and death of plants due to blockage of the conductive tissues of the lower stems and main roots. Moisture early assists the development of the disease and later dry conditions hasten the death of plants. There is no practical control of the disease in the home garden, as it will live indefinitely in the soil. Rotation should be practised and peas, which are also subject to the disease, should not be sown in infested areas.

New Sheepyards Bulletin

SHEEP farmers are always very interested in methods which facilitate the yarding of sheep, and as an efficient design of sheep-drafting yard is one of the greatest aids in this work, the Department of Agriculture has published recently Bulletin No. 353, "Design and Construction of Sheep-drafting Yards".

The bulletin deals with all aspects of yard layout, emphasising the importance of a good site and good drainage. A section on construction materials, giving the advantages and disadvantages of concrete compared with wood, is included, and different designs of fences and gates are described and clearly shown in illustrations and drawings. The pens and branding and drafting races are fully dealt with, as is the incorporation of efficient foot-rot troughs and baths in the general yard layout. A feature of the publication is the six detailed plans of yards of different sizes, ranging from one for handling about 250 sheep to a large circular one which can deal with 2000 or more animals. The text accompanying each plan gives details of material quantities and costs.

The bulletin is available free at any of the Department's offices throughout the country.

Using Firearms Safely and Skilfully

ALTHOUGH firearms are generally regarded as weapons to be used for sporting purposes, they are of value to the farmer in increasing the productivity of his fields and pastures. The importance of these weapons on the farm was recognised during the war, when farmers' rifles were exempted from the regulations impressing sporting rifles of military types for the Home Guard. This article is the first of a series by G. G. Kelly, Arms and Ballistics Officer to the Police Department, which explains the mechanics of firearms and which is intended to assist younger farmers to gain a better understanding of them and an appreciation of the safety and skill with which they should be handled.

MAN is the only real enemy of most of the animal pests with which the New Zealand farmer has to cope. Because of this and the abundance of food and the mildness of the climate animals like the goat, wild pig, rabbit, deer, and opossum multiply so quickly that farmers are faced with a severe and costly task in checking, where they cannot exterminate, them.

The efficiency of the modern firearm and its ammunition makes it possible for every shot to be effective, but this is not happening largely because the skill of the user is often too far short of the capabilities of the weapon and cartridge. Too often, also, the mechanical features of some of the older weapons remain a dangerous mystery to learners.

The three main considerations in the use of a firearm are safety, accuracy, and speed. They should be kept in this order at all times and in all circumstances. They all depend upon the user, who could doubtless learn them for himself if given the time and the required practice, but the rudiments of safe marksmanship can be taught in a short series of lessons.

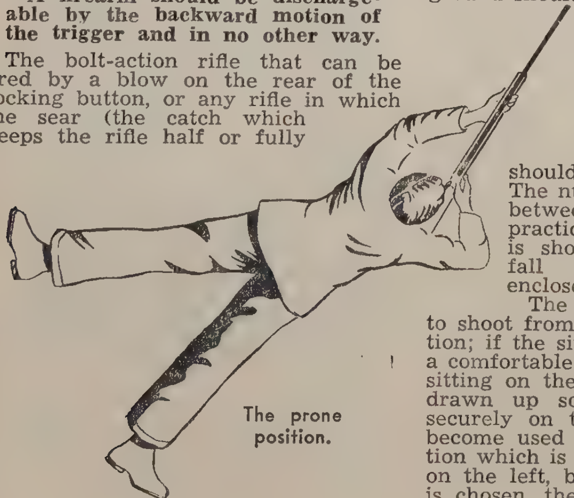
Of all animal pests in New Zealand the rabbit is probably the worst and the most useful firearm available for its destruction is the .22in. calibre rifle. Though many prefer the shotgun, especially for quick shots at scurrying targets in scrubby country, the cost of its ammunition is considerably higher than that of .22 ammunition.

Mechanical Safety

The mechanical safety of a rifle and the safe technique in using it are both important.

A firearm should be dischargeable by the backward motion of the trigger and in no other way.

The bolt-action rifle that can be fired by a blow on the rear of the cocking button, or any rifle in which the sear (the catch which keeps the rifle half or fully cocked) can be jarred out of place from the full-cock position or from any position in between the uncocked and cocked positions, should not be used.



The prone position.

Modern rifles are being made with mechanisms intended to prevent these accidental discharges, but a very large number of older rifles of a less desirable type are being used and are liable to be bought and sold on the second-hand market.

Handling and Carrying

After it has been ascertained that the weapon is suitable and safe, skill in its handling must be acquired. All students of shooting must be carefully impressed with the absolute importance of handling the rifle so that the muzzle of the weapon is pointed either up or down and any accidental discharge is therefore spent harmlessly.

The handling and carrying of a firearm must begin as a drill and be persisted with until the user becomes automatic in his technique of safety. His mental attitude must at all times be the same—that he has a loaded firearm in his hands and that there is no such thing as an unloaded one. With any other attitude he will be trying to obey two sets of rules—one with a loaded firearm and the other with an unloaded one.

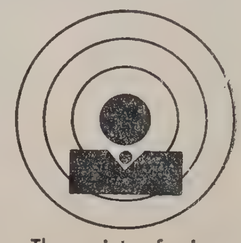
Shooting Practice

When the student has reached the proper degree of safe handling he will be ready to start shooting practice, which can best be done by target shooting. A range with a secure background should be chosen and a target set up at a measured distance of 25yds. The target can be any shape or size, but a 12in. square of stiff cardboard or timber is satisfactory. The bullseye should be the size of a penny. The number of shots should be between 5 and 10 at each practice. A fair degree of skill is shown when all the shots fall on the inner circle enclosed by the penny ring.

The student may be advised to shoot from a sitting or prone position; if the sitting position is adopted, a comfortable hold can be obtained by sitting on the ground with the knees drawn up so that the elbows rest securely on them. This is easier to become used to than the prone position which is shown in the illustration on the left, but if the prone position is chosen, the learner would do well to use a rest of soft material for the fore part of the rifle, either barrel or fore-end, or, better still, a firm support for the left forearm itself.

In sighting a rifle it is always better to use the full sight, in which the top of the foresight is kept level with the shoulders of the rear sight. The point of aim should be about ½in. below the bullseye on the target.

The learner can follow these instructions quite readily alone, but it is always better to have an experienced person with him to advise and assist.



The point of aim on a target should be about ½in. below the bullseye.

Care should be taken to see that the bullets, which travel at a velocity of nearly 1400ft. per second are absorbed safely in the stop bank. Targets must not be placed against a brick wall or any other hard substance, as fragments are apt to fly or splash backward from such matter.

Accuracy is assisted in aiming where it is possible to use aperture rear sights (see the illustration at the top of this page). These give a longer sighting base and make sighting easier and more accurate. A widely experienced rifleman has said that no important rifle competition has ever been won by a man using open sights in competition with others using the aperture sight.

With modern rifle ammunition of .22 calibre it is quite unnecessary to clean out the bore of the rifle. It is enough to wipe over the outside of the arm with an oily rag before putting it away.

◆

LIST OF VETERINARY SURGEONS

The complete list of registered veterinary surgeons in New Zealand as at December 1951 has been published by the Department of Agriculture. Copies are obtainable from Publications Section, Department of Agriculture, P.O. Box 2298, Wellington, at 1s. per copy, post free.

Trends in New Zealand's Lemon-growing Industry

By W. A. FLETCHER, Citriculturist, Department of Agriculture, Auckland

THE commercial lemon-growing industry in New Zealand is faced today with the need to decide on planting policy which will have a marked influence on its future. During the last decade plantings of a new variety, the Meyer lemon (probably a sweet orange-lemon hybrid), have increased rapidly, whereas plantings of the standard lemon varieties have steadily decreased. Owing to the pronounced seasonal bearing habit of the Meyer lemon a very serious upset in the regularity of future supplies of lemons will be experienced if this planting trend is continued over the next few years.

[National Publicity Studios photo.

IN 1949 a survey by the Department of Agriculture indicated that there were about 38,200 standard lemon trees and 10,800 Meyer lemon trees growing in commercial orchards in the Dominion. The total of standard lemon trees was made up of 28,200 healthy mature trees, producing the bulk of the crop, together with 5300 young non-bearing trees and 4700 unproductive trees in poor condition. Of the Meyer lemon trees by far the greater number, about 9600 trees, had been planted during the previous 10 years. Much of the present production, however, comes from these young trees, which come into bearing much earlier than standard lemon trees.

Expected Decrease in Standard Lemons

It is estimated that by 1959 the number of sound mature standard lemon trees will have decreased from 28,200 to 20,900; whereas the number of full-bearing Meyer lemon trees is expected to increase from 1200 to 10,600. The average yearly production of lemons in 1949 was estimated at about 113,200 ¾-bushel cases of standard lemons and only 10,300 ¾-bushel cases of Meyer lemons. With an average annual intake of about 6400 cases of imported lemons, the national market absorption level at that time was about 130,000 ¾-bushel cases. By 1959, owing to the expected decrease in numbers of mature bearing trees, receipts of standard lemons can be expected to fall from 113,200 cases to about 85,300 cases. As the young Meyer lemon trees reach maturity it is estimated that their production will increase to about 35,000 ¾-bushel cases by that time. (Production for 1951 is estimated at 19,400 cases.) The total receipts of lemons to be expected in 1959-60 are therefore about 120,300 ¾-bushel cases, and if an estimated 20 per cent. increase in population is allowed for, approximately 10,200 more mature trees would be required to increase production up to an expected market absorption level of 156,000 ¾-bushel cases.

Standard lemons mature all the year round, although production is heavier in winter and early spring. Meyer lemons, however, have a pronounced season, with the result that further extensive plantings of this variety would seriously affect the regularity of supply of lemons. Generally 80 per cent. of Meyer lemons are produced in the 5-month period June to October, whereas only 48 per cent. of standard lemons are received then. Even if standard lemon trees alone were planted to fill the production gap expected by 1959, the Meyer lemon trees already planted will tend to create an over-supply of lemons in the June to October period, and a shortage in the November to May period of about 6100 cases. If only Meyer lemon trees were planted to fill this gap, however, a very serious upset in the regularity of supply of lemons could be expected. It is estimated that about 17,500 ¾-bushel cases would be over-supplied in June to October and that there would be a corresponding shortage during November to May.

During the 1950 season the total number of lemon trees planted in Kerikeri, Auckland, Tauranga, and Gisborne was 3700 standard lemons and 1300 Meyer lemons. The increase in standard lemon tree plantings is accounted for almost entirely by the Te Puke development scheme, opened in 1947 as a rehabilitation project. There appears to be little inclination in Auckland and Kerikeri districts to plant replacements in existing standard lemon orchards. Meyer lemon plantings, however, are still being maintained at a fairly high level, although the peak seems to have been passed at Kerikeri at least, where there was a big drop in the 1950 planting season.

It seems evident from a survey of the position that further commercial plantings of Meyer lemons should be discouraged and that future plantings should be confined entirely to standard lemons, particularly such varieties as Genoa and Eureka, which tend to produce a greater portion of their crop in summer than does the Lisbon lemon.

Early Planting of Standards

As it takes about 10 years before a young standard lemon tree bears a fair crop, to prevent a drop in production it is essential that the estimated figure of 10,200 trees required to provide the extra production necessary by 1959-60 should be planted as quickly as possible.

In the 1950 planting season 5000 lemon trees were planted in commercial orchards. This figure represents nearly half of the number of extra lemon trees required and indications are that the full number will probably be reached during the 1952 planting season. A yearly replacement programme of approximately 1300 trees will be all that is then necessary if production is to be maintained at a controllable level.

Fairly substantial plantings of standard lemons are expected this season, mainly in the Bay of Plenty area. Few plantings are expected in Auckland, but figures for Kerikeri and Gisborne should be more satisfactory.

Although Meyer lemon tree plantings seem to be slackening off slightly, they were still fairly heavy last season and are expected to be appreciable again this season, particularly in the Bay of Plenty area.

Importance of Even Supply

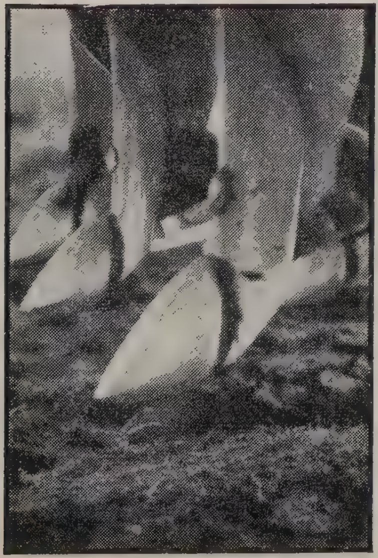
In the interests of the consumer, the grower, and the country as a whole, it is most desirable that lemon supplies be spread as evenly as possible over the year. To achieve this, it is essential that no further Meyer lemons be planted for many years and that future production be sought from the more continuous-cropping standard lemon varieties.

Drilling Seed into Tussock Grassland

A TRIAL of a new method of introducing seed into tussock grassland by drilling it into an unprepared surface with a grain drill the coulters of which are fitted with special penetrating points is described in this article by L. W. Blackmore, Instructor in Agriculture, Department of Agriculture, Timaru. Comparisons are made between the effectiveness of this method compared with broadcasting and the use of a drill without special points. The trial also showed that both grasses and clovers could be established satisfactorily by this method. An added advantage was that phosphatic fertiliser could be placed close to the seed. The good establishment of white clover particularly is attributed to the method of sowing and the placement of the fertiliser.

THE success of surface sowing of seed on native or established pastures depends largely on the rainfall, the tightness of the sward, and the amount of roughage present. Even with the most favourable climate the chances of introduced seed being established are greatly reduced where existing vegetation prevents it from making direct contact with the soil. Under adverse climatic conditions, especially where the ground is likely to dry out quickly, contact with the soil is not sufficient to ensure establishment. Best results are secured when the seed is placed in the soil, preferably with manure in close contact to ensure satisfactory establishment. This can be achieved by either of two methods, one by cultivating and then drilling, and the other by drilling directly into the sward without any preliminary working. This article deals with the second method.

Drilling in on the tussock. Under rough conditions drill speed must be considerably reduced.



"Grassland" tips fitted to the coulter points of a drill. The pointed tips allow the coulters to penetrate readily. In the working position the tips have more dip than is shown here.

In October 1948 the Department of Agriculture laid down a trial in the Mackenzie Country in which various grasses and clovers were sown on tussock country by both drilling and broadcasting. The area, about 2000ft. above sea level, was typical of many square miles of unimproved tussock land on the Mackenzie Plains. For most of the drilled area the coulters of the drill were fitted with special "grassland" tips. These consist of specially designed castings with hard steel along the lower leading edges and bottoms. Because of their comparatively sharp, downward-tilted point, these attachments give the coulters greatly increased penetration.

The action of the tip is as follows. When the drill is in motion the leading edge, which is comparatively sharp, cuts open the sward. This cut is opened to the full width of the point as the drill moves forward. The seed and manure fall in and the cut partially closes behind the coulter. A more complete cover of the seed may be obtained by light harrowing. The harrows may either be attached to the drill or used separately. The most suitable type of harrow to use depends on the nature of the country. Where tussock is present a long-tined harrow of a flexible nature such as the tripod has been found very suitable.

Operation

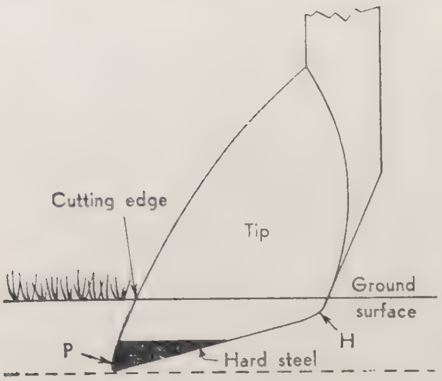
When the grassland tip is used the bottom of the tip (heel end) should be flush with the coulter point so that maximum support is given to the tip. The lower leading edge should be slightly dipped (see diagram) to give maximum penetration. The drill can be adjusted in two ways to achieve this penetration. First, the amount of "rake" on the coulters may be varied (the tips are made to operate when the hand lever is in the middle position for the Duncan type of drill and the forward position for the Massey type), and second, the hitch may be raised or lowered. After the tips have been used for some time penetration may be reduced by wear. This can be overcome by lowering the hitch a little, but it is better to build up the tips again with hard steel.

To increase penetration and to reduce "skipping" to a minimum a spring-pressure drill should be set to exert a working pressure of about 10lb. per coulter. It is likely that on very uneven ground a drill without spring pressure, but with independently weighted coulters, would give a more uniform depth of sowing over the bumps and hollows, because the coulters would then be free to follow the contour of the ground surface. On rough going, however, drilling must be slow for good results.

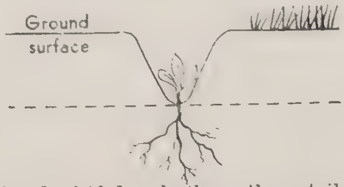
Comparison with Ordinary Points

In the trial standard drill points were tried out against others fitted with the special tips described. The tips have three main advantages:—

1. They ensure better and more even penetration, as was shown by the fact that seed established well in tussock.
2. They provide a good cover for the seed. After the tip passed over the surface it left a V-shaped depression into which the seed and manure fell. This is an advantage under very dry conditions, especially where little vegetative cover is present, as the seedling is protected in its early stages of development from the full effects of drying winds. Further, as the seed is on a firm bottom, it has all the advantages of being sown under conditions of good consolidation. This important advantage would largely be lost if the land was hustled before drilling.
3. They are self clearing. Because of their ability to penetrate readily, the points fitted with tips cleared much better. As the lower leading edges of the tips were almost constantly below the surface, trash could not collect under them and cause the points to ride on the surface.



Left—Diagram of special point on coulter. The point P of the tip should be dipped slightly, and the heel H should be just below the ground surface. Below—Cross section of cut made by the drill. The seed is placed with the manure on firm moist soil, and later the young seedling is protected from drying winds.



Comparison with Surface Sowing

To compare the strike and establishment from surface broadcasting with that of drilling in the way described a block in the trial was sown broadcast by removing the coulters and allowing the seed and manure to fall on to the surface. The strike and establishment in the drilled area were strikingly better than in the broadcast block. The reasons for the difference appear to be that the bulk of the drilled seed was effectively placed in the soil whereas part of the broadcast seed was either caught up in the tussock or other vegetation or at best lay on the surface of the soil and exposed to the vagaries of the weather. The drilled seed was, on the other hand, assured of a more continuous supply of moisture, while the fertiliser placed in direct contact with the seed gave quick establishment.

Over 20 different species and strains of plants were sown by this method. Very good strikes were obtained with lucerne, sweet clover, crested wheat grass, white clover, and subterranean clover. The strike of the clovers was particularly good due to drilling and placement of the fertiliser.

It is doubtful whether the strike and establishment of seed sown in the broadcast area were one twentieth that of the drilled portion, in spite of the fact that the conditions for establishment were better than average for the district. The average rainfall is between 15in. and 20in. per annum. When the present high cost is considered the establishment in the broadcast area could not possibly be regarded as an economic proposition.

In view of the lesson learned from this trial the wisdom of surface sowing in areas of low rainfall is very much open to question.

Uses of Grassland Tip

The grassland tip would appear to have possibilities for introducing seed into native pasture where ploughing is not desirable or economic. For instance, it is likely to be valuable on tussock country where it is essential to retain the tussock or where wind blowing of ploughed or worked soil is a problem. A further possible use is for the introduction of clovers into pasture where these have failed to establish successfully. The tips have been tried out for the surface introduction of subterranean clover on light, stony soil, but though they met with a measure of success, they were not very satisfactory under these conditions because the stones prevented good penetration and wear was excessive. The best procedure in such conditions is first to hustle twice in the same direction with narrow points, then drill with no pressure on the springs, and finally cover with the harrows. Lack of consolidation round the seed if the weather after drilling is dry is the chief disadvantage of this method.

The attachment of grassland tips to the coulter points of a drill shows promise for the surface drilling of grassland under certain conditions. The tips have yet to prove themselves for use on a wider scale. However, they would seem to be worth a trial where conditions appear suitable.

Cuts made in the surface after the drill has passed over the area. The tussock in the centre has been split in two without being pulled out. The tips will similarly cut a passage through scabweed.

Oversowing Hill Country

SOME 70 co-operative trials on the introduction of clovers on hill country are being conducted by the Department of Agriculture as part of a topdressing improvement programme. These trials are a continuation of trials carried on since 1939 and aim at finding the most suitable clovers for different classes of hill country, the best time for sowing, the most suitable conditions for oversowing, and the best stock management for oversown areas.

WHITE clover is recommended for oversowing on the more fertile types of hill country, where the rainfall is between 45 and 50in. a year. Topdressing with phosphates is essential to the establishment and good growth of white clover. Subterranean clover is recommended for sunny, dry faces and on all country with under 45in. of rain a year. Phosphatic topdressing is also essential for the establishment and good growth of subterranean clover. *Lotus major* is recommended as a pioneer legume with or without phosphatic fertilisers in high-rainfall districts. Satisfactory establishment and growth have been obtained with red clover on the better soil types with 45 to 60in. of rain a year.

Time of Sowing

In the trials all clovers have shown better establishment from autumn than from spring sowings. Generally the earlier the seeding in the autumn the better the establishment, providing the dry summer weather has broken and there is no prolonged dry spell after seeding.

Rate of Seeding

The trials indicate that the strike is more affected by climate, type of soil, area of ground, time of sowing, and other factors than by the amount of seed sown. Very satisfactory strikes have been obtained by seeding rates of 1½ to 2lb. of white clover per acre, 3 to 4lb. of subterranean clover, ½lb. of *Lotus major*, and 3 to 4lb. of red clover. Stock management after sowing is important, particularly the spelling of newly established subterranean clover pasture to allow reseeding.

—*C. J. HAMBLYN,*
Fields Superintendent, Department of Agriculture,
Palmerston North

Beekeeping in Tauranga County

By R. GODDARD, Apiary Instructor,
Department of Agriculture, Tauranga

BEEKEEPING in Tauranga County has grown tremendously in the last few years and there are 20 commercial beekeepers operating approximately 6000 hives. The annual production of honey, which has more than doubled over the past 5 years, is estimated at 230 tons. Additional honey produced in domestic apiaries is considerable.

Apiary and honey house at Paengaroa.

TAURANGA COUNTY, on the sea coast of the Bay of Plenty, extends from the Athenree Gorge in the north-west to the Otamarakau Valley in the south-east and is bounded inland by the Kaimai Range. The county is approximately 70 miles long and its width varies from roughly 8 to 30 miles.

With the exception of a large area of swamp country in the Te Puke district, the topography of the county is undulating to hilly, with rolling country near the coast rising to a series of low hills. A characteristic feature of the landscape in the Tauranga and Te Puke areas is the series of steep parallel gorges which run approximately at right angles to the coast. These gorges, which are 100 to 200ft. deep and about 200yds. wide, break the country into a series of plateaux along which farming is carried out. The gorges widen as they near the coast and ultimately merge with the rolling coastal country.

Most of the coastal country is developed, but large areas of the upper regions are still covered with fern and manuka and there are big areas of native bush further inland and along the Kaimai Range. The series of gorges are uncultivated and covered mainly with native bush, and from this source early-spring feed is available for bees.

Soil Types and Climate

Most of the soils in the county are pumiceous in origin; they warm up rapidly in spring, but are liable to dry out fairly rapidly in summer. Soil types are undoubtedly important in relation to nectar secretion and the resultant crop of honey, but contrary to results obtained in other areas with similar soil types, clover both grows and blooms profusely in this district, but only occasionally does it yield nectar freely.

Usually good weather is experienced when the honey flow starts in late November or December, and the rainfall, which averages 52.9in. a year, is reasonably well distributed over the district, but there is danger of droughts in January, February, and March.

History

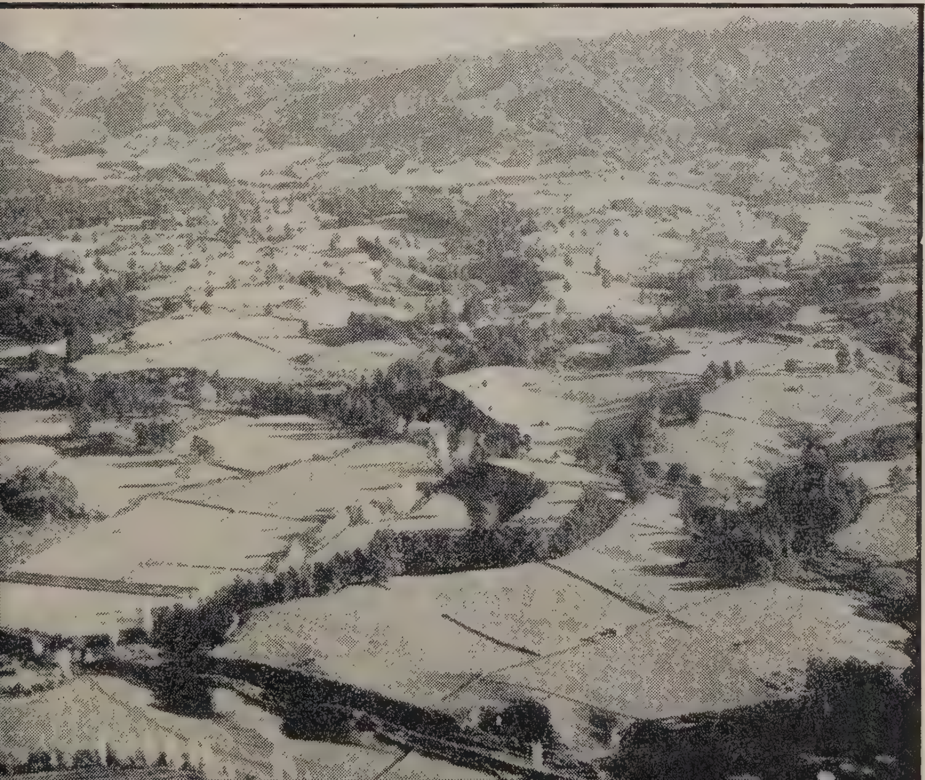
Commercial beekeeping in any large way did not start in the county until the late 1930's. During the next few years one or two beekeepers worked the district, but it was not until about 1940 that apiarists realised its potential value for beekeeping. However, rapid expansion did not take place until the end of the Second World War. The number of beekeepers and hive holdings has doubled over the past 6 years.

The hives are distributed fairly evenly throughout the county, but due to the rapid growth of commercial beekeeping, overlapping of apiaries has taken place and established beekeepers are now finding it extremely difficult to find new apiary sites without further encroachment.

Apiary Management

In the mild climate of this district brood rearing in the hive is carried on to some extent throughout winter; consequently, hives build up rapidly on the early nectar flow from manuka and willow. Usually, difficulty is experienced in keeping colonies in two brood chambers, and it is often necessary to add a further super. A critical period is reached when, as invariably happens, a break in the fine weather occurs during the latter part of October. High winds and rain are quite common at that time of the year and, if not watched carefully, hives full of brood become dangerously low in stores. Many inexperienced beekeepers have lost as many as 60 per cent. of their hives at this stage of the year.

With queens laying all the year round it is essential that hives be requeened annually. Most commercial



At left—The undulating Katikati area is stocked heavily with bees.

beekeepers breed their own queens, but some prefer to buy from reputable queen breeders. The leather-coloured Italian bee seems to be preferred. Beekeepers are somewhat fortunate in that the early nectar flow and mild weather enable them to produce good-quality queens in spring. Good mating is normally achieved, but failures sometimes occur when the weather is unsuitable. Autumn-reared queens are also favoured and beekeepers make good use of their many nuclei hives to carry the queens over the winter.

Even with annual requeening of hives, swarming is occasionally excessive, but generally beekeepers who practise normal swarm control procedure are capable of preventing the loss of swarms and the resultant loss of crop.

Diseases

For many years American foulbrood disease (*Bacillus larvae*) hampered the progress of commercial beekeeping in the county, and at one time it was feared that this dreaded disease would force existing apiaries out of the area. For this reason the Te Puke and Tauranga areas were considered unsuitable for beekeeping, but systematic inspection of hives over the years by beekeepers and Instructors of the Department of Agriculture, plus the burning of all diseased hives, gradually cleaned up the area. Today occasional outbreaks are experienced, but the situation is now well under control.

Nosema apis disease was prevalent two or three years ago, but regular requeening of hives seems to have overcome this problem to a large extent.

The larger wax moth (*Galleria mellonella*), which breeds freely on this coastal strip, is one of the serious pests and in the past the larva of this moth has caused great damage to stored combs and on combs containing pollen. These pests breed prolifically and cause widespread damage in a very short time. Fortunately, however, stringent control measures undertaken by commercial beekeepers have prevented this pest from gaining the upper hand.

Equipment

Most beekeepers in the county use the 10-frame Langstroth hive, which is recognised as standard throughout New Zealand.

Honey houses have shown a marked improvement over the last few years, with most beekeepers preferring the one-floor system with the honey pump an essential part of their extracting equipment. Warming rooms to facilitate honey extraction are very much in favour and they are gradually being installed. For the producer packing honey in retail containers, cool rooms are also essential in this district, as the high temperatures in January, February, and March make satisfactory granulation of newly extracted honey impossible. With cool rooms maintained at a constant temperature of 56 degrees F. during the honey-packing season it is possible to have a smooth-grained honey a few days after extracting.

Nectar Sources

A wide range of flora from both pasture lands and bush sources is available to bees. During the past few years it has been most significant that bush and pasture sources have yielded nectar alternately each season; thus beekeepers whose bees are within reach of both sources have been assured of a crop even when one or the other of the two sources has failed.

Land development is proceeding rapidly and a wider range of clover pasture is gradually being made available to the bees. However, in the steep gorges and hills and in the swamp land big patches of manuka still remain. Most beekeepers do not extract honey from this source, but save it for bee feeding. Some apiarists have special apiaries situated in manuka areas for the collection of feed honey. By this method they are able to strip other hives of all good-quality honey and the manuka honey is used for winter bee feeding.

Straight willow (*Salix fragilis*), cabbage tree (*Cordyline australis*), and barberry (*Berberis vulgaris*) are also invaluable nectar sources in spring. In some years a surplus of barberry nectar is collected and stored by the bees, but as the honey is very dark, producers prefer the bees to use this honey for brood rearing.

Gorges break the country into a series of plateaux. Rewarewa trees are in foreground.

The heaviest nectar-yielding tree in this area is the rewarewa (*Knightia excelsa*), which abounds all along the foothills and in the gorges. The honey is dark and has a sweet, mild, toffee-like flavour. In good years hives have been known to average 160 to 200lb. surplus from this source. Other bush species which attract the bees and yield nectar heavily are the koutukutuku (*Fuchsia excorticata*) and five finger (*Nothopanax arboreum*) in the spring and tawari (*Ixerba brexioides*) and kamahi (*Weinmannia racemosa*) later in the season.

Pohutukawa trees (*Metrosideros tomentosa*) are most conspicuous along the coastal stretches of the county, where they usually bloom in December. It is possible to see the nectar glistening in the bases of the flowers and a shake of a branch will bring down a shower of it. Big crops of water-white honey are stored in apiaries near pohutukawa, as the bees work these trees very heavily. The honey has a characteristic flavour which is quite pleasant once the taste has been acquired. Beekeepers have found that this honey must be extracted quickly, as it is liable to granulate in the combs in 10 to 15 days.

On few occasions good yields from clover are obtained, but generally it yields very spasmodically and it is rather fortunate for the beekeeper that *Lotus major* (*uliginosus*), which abounds throughout the county, yields nectar quite heavily and the honey produced is of very good quality. Buttercup (*Ranunculus* spp.) is also fairly prominent in parts of the district and catsear (*Hypochaeris radicata*), dandelion (*Taraxacum officinale*), and hawkweed (*Crepis capillaris*) are invaluable minor sources of nectar supply in the county. Blackberry (*Rubus fruticosus*) grows on much of the uncultivated land. The honey from this source is dullish white and has a very pleasant flavour.

Shelter and Apiary Sites

Although difficulty has been experienced in getting suitable apiary sites to which access is available by truck, most beekeepers have their apiaries in excellent situations. As winds are usually fairly severe in the latter part of spring, apiaries must be well sheltered. The most popular type of shelter used by farmers and orchardists is lawsoniana or barberry. Fortunately, these two hedges also give ideal shelter to the bees, and the undulating country allied with intelligent planting of shelter belts help to break up the severe winds.

There are many large orchards in this area producing citrus and subtropical fruits. Although citrus are largely self-pollinating, blossom fertilised by the bees appears better able to withstand sudden changes of temperature. Orchardists are fully aware of the bees' value for pollinating and beekeepers are frequently requested to place hives in or near orchards.

All photographs by Rendell's Photo Service.

Dairying on Canterbury Light Land with Aid of Irrigation

THE carrying capacity of a great deal of the light land in Canterbury varies between ¾ ewe and 1½ ewes per acre. It will readily be seen, therefore, that such land is totally unsuitable for dairying. At best it could perhaps carry about 1 cow to every 5 acres and even then there would probably be occasional feed shortages. Could the application of irrigation make this light sheep country suitable for dairying? To obtain information on this point a dairy farm was established by the Department of Agriculture on light land at the Winchmore Irrigation Research Station 5 years ago. This article by G. K. McPherson, Irrigation Research Officer, Department of Agriculture, Ashburton, describes the development of the farm and the results so far obtained.

Water flowing out of one of the head gates on to a border at the Winchmore Irrigation Research Station. Note the canvas dam.

CANTERBURY has never been regarded as a dairying province. The climate and the soil types generally are considered more suited to a combination of cropping and sheep farming. Some dairying is carried on, however, in localities more favourable to this type of farming. On Banks Peninsula and in the Temuka district, for example, there are 11 small cheese factories with a total output of approximately 2500 tons annually. There are also five butter factories in the province, with a combined annual output of about 3500 tons.

The cream for the butter factories comes mainly from mixed farmers who milk a few cows as a sideline. In fact most of the suppliers milk fewer than 10 cows each and a great many of them milk fewer than 4 cows. The few real dairy farmers supplying butter factories—those whose main source of income is derived from dairy products—are confined largely to the heavy land bordering the rivers or to the higher-rainfall belt along the foothills. With dairying in the province confined mainly to those areas where alternative types of farming would not prove successful, it is only natural that there would be doubts about the wisdom of establishing a dairy farm on light land even with irrigation available.

The idea that a dairy farm should be established at the Winchmore Irrigation Research Station came originally from the Ashburton Rehabilitation Committee. The committee's view was that if the venture proved successful, it would indicate another means of settling returned soldiers on the land. To many at the time the thought of establishing a dairy farm on light land, even with the use of irrigation, seemed almost fantastic. Their view no doubt was that as dairying was not regarded as suitable for the heavy land in the province, it could not be a success on the light land.

However, a decision to establish a dairy farm of 150 acres was made toward the end of 1946. Naturally, if it was to serve the purpose intended, that is to prove a method of assisting the settlement of returned soldiers, the farm would have to be developed rapidly. How much butterfat per acre could it produce? Was it possible to grow sufficient winter feed for the stock? Could replacement stock be reared on the farm? How much lime and superphosphate was necessary for topdressing? What stock diseases were likely to be encountered and what returns were likely to be expected from pigs? The policy on the farm has been one of rapid development to find an answer to these important questions, and many others, as quickly as possible.

Development

At the time the property was acquired approximately half the farm had been border diked and sown down in good permanent pasture by the Department of Lands and Survey. The remainder was in crop or old browntop pasture. There were no buildings on the block and very little subdivision fencing had been carried out. The water supply was in a stock water race of about 30 chains along one boundary fence.

Land Preparation for Irrigation

Of the 150 acres comprising the farm, about 120 acres have been prepared for irrigation by the border-dike method. The remainder of the farm is not suitable for border diking, but it receives some water by the wild-flooding method. The border diking was carried out by the Ministry of Works and the installation of head gates and junction blocks by the farm staff.

Subdivision and Buildings

Subdivision has been carried out to give paddocks of approximately 8 acres each. The ultimate aim is to milk a herd of 80 cows, and this subdivision will give a grazing rate of 10 cows per acre. A race approximately a chain wide runs through the centre of the farm and most paddocks are connected to this control race.

One of the first jobs was the provision of essential buildings. Two houses, an internal-race cowshed with a 4-cow plant, a calf shed, and an implement, fertiliser, and tool shed were erected. Later a modern piggery was constructed with suitable outdoor pens and recently a Dutch barn capable of holding 3000 bales of hay was built.

Water Supply

From the 30 chains of stock water race which ran along one boundary fence when the property was acquired it was not possible to reticulate to every paddock on the farm, so an underground tank of 4000 gallons capacity and fed from the stock water race was constructed. A pressure pump was also installed by which water was pumped through ¾in. and ½in. galvanised piping to concrete troughs in each paddock.

Sewerage

With the land almost flat the disposal of the sewage from the cowshed was a problem. A concrete tank was installed from which the sewage is pumped by a sludge pump into an irrigation ditch from where it is eventually spread over the land.

Freezer Installed

Because of the high temperature of the water during summer, a water cooler was found unsatisfactory for cooling the cream. A freezer capable of holding eight 10-gallon cans of cream was therefore installed in the dairy. Cream is transferred to the cooler on completion of each milking.

Establishment of Pastures

By far the greater portion of the farm has been sown down to permanent pasture with the following mixture:—

You need a

Power Plus

battery whatever you drive

5 TYPES for all makes

9-plates, 12 volt Heavy Duty
13-plates Heavy Duty
13-plates General Duty
13-plates Squat, for 8 h.p. and 10 h.p.
15-plates Heavy Duty

Replace with a Ford BATTERY

At Ford Dealers, Leading Garages and Service Stations.

FORD MOTOR COMPANY OF NEW ZEALAND LIMITED, LOWER HUTT

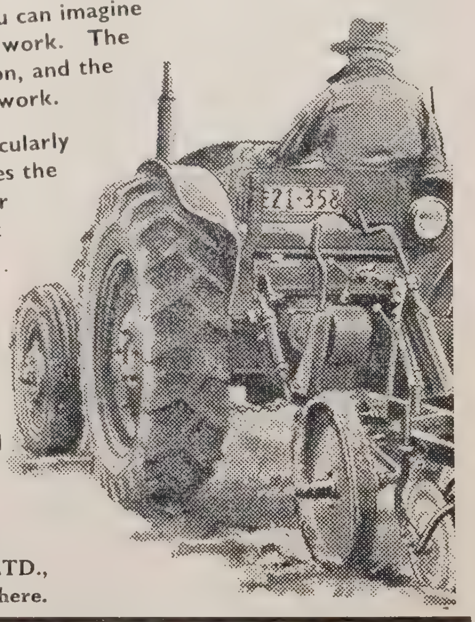
72.9

DAVID BROWN Diesel —the tractor for the man with slogging work to do—read what H.B.H. of Ohau says:

We are contractors and we put this machine into all classes of work, both heavy and light. Some of the work which is done is giant discing, discing and ploughing, and general agricultural work. We have also fitted this machine with a bulldozer and a loader, so that you can imagine the machine is kept in constant work. The loader which is fitted will lift 1¼ ton, and the tractor makes no effort of this work.

The running costs are particularly light, and on no class of work does the consumption exceed 1 gallon per hour. On a considerable amount of the work the consumption is about 5/8ths of a gallon of Diesel per hour.

In all this time the machine has cost us nothing for repairs, excepting, of course, such things as periodical servicing of injectors.



Petrol Models also available.

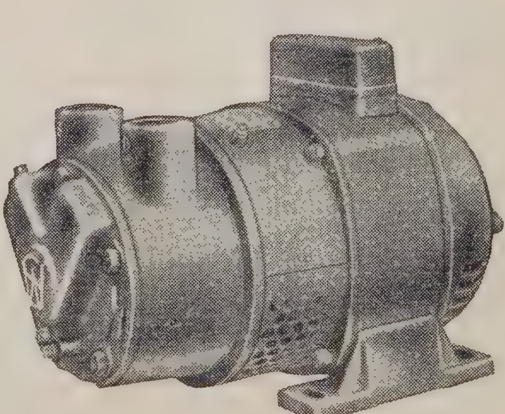
N.Z. Distributors: TODD BROS LTD., Wellington. Dealers everywhere.

THE WORTHINGTON SIMPSON

MOTOR DRIVEN SELF-PRIMING

DOMESTIC PUMP

THE IDEAL PUMP
for:
Farms,
Market-Gardens,
Estates,
General Domestic
and similar services.



Distributors:

A. & T. BURT LTD.

AUCKLAND
DUNEDIN
WELLINGTON
WANGANUI
INVERCARGILL
CHRISTCHURCH
TIMARU

Enquire from your local WORTHINGTON SIMPSON Dealer.

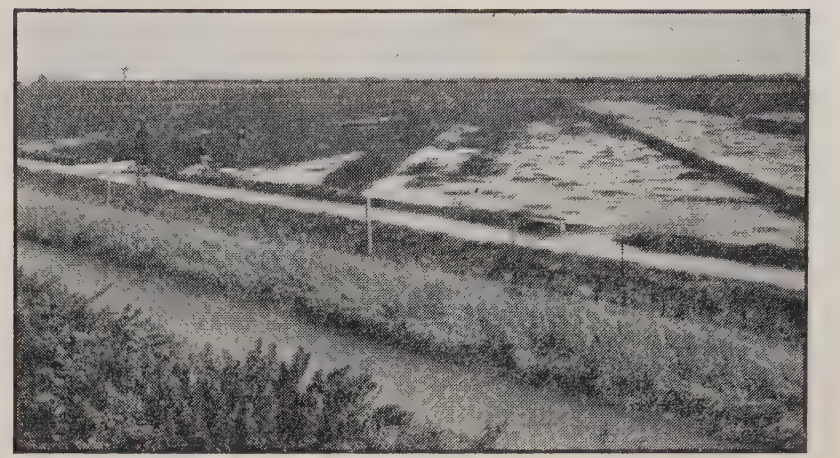
	lb. per acre
Perennial ryegrass	30
Cocksfoot	5
Timothy	4
Dogstail	1
White clover	2
Montgomery red clover	2

Some 30 acres were sown in a semi-permanent mixture as follows:—

	lb. per acre
Short-rotation ryegrass	30
White clover	2
Montgomery red clover	2

The remainder of the farm, comprising mainly the area not suitable for border diking, was sown with 12lb. of cocksfoot and 2lb. of subterranean clover per acre.

The method of sowing was to broadcast all the seed on a rolled surface and cover it with light harrows. In most cases 2cwt. of superphosphate per acre was applied at the time of sowing. One ton of lime per acre was also applied either on the cultivated ground or on the established pasture.



Irrigating one of the pastures on the dairy farm.

Development of Pastures

The manner and speed with which the pastures have developed under cattle grazing have exceeded all expectations. For the first 18 months or so the application of water tended to produce a clover-dominant sward. From then on, however, the grasses asserted themselves and a good, balanced, high-producing pasture resulted. The inclusion of cocksfoot, timothy, and crested dogstail in the mixture appears to have been justified. Recently the production from one of the permanent swards was measured over a 12-month period and a total of 9310lb. of dry matter per acre was recorded. This compares very favourably with the production of a good Waikato pasture. The essential difference between a North Island dairying pasture and an irrigated pasture on light Canterbury land lies in the lower winter and early-spring production of the latter. Under the cold conditions prevailing in Canterbury grass growth from the middle of May till the middle of September is practically negligible. On the other hand, with irrigation available a drop in production, such as occurs in drought periods in the North Island, can be avoided, and this is reflected in the butterfat returns.

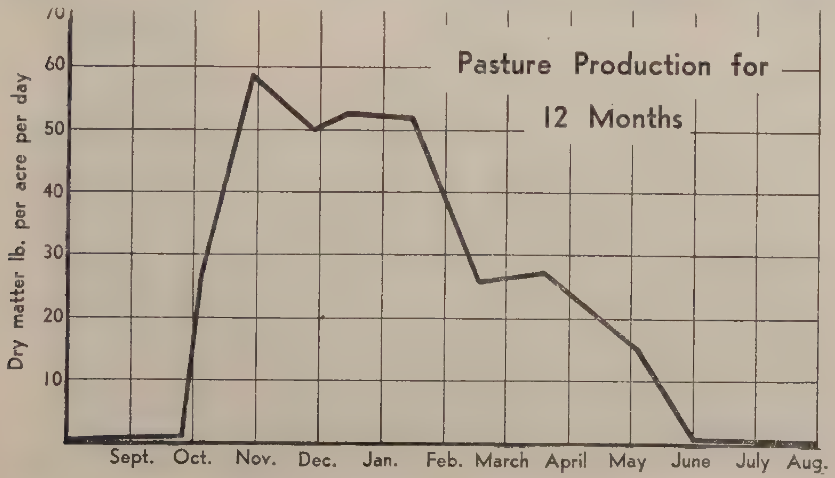
The semi-permanent pastures of short-rotation ryegrass and clovers have proved very valuable, not only for grazing but also for the production of out-of-season grass, which will be discussed more fully later.

Topdressing

Superphosphate has been the only fertiliser used for topdressing. Half the farm has been topdressed in autumn with 2cwt. of superphosphate per acre and the remainder in spring with a similar quantity. Apart from the initial application, 5cwt. per acre of lime has also been applied over half the farm annually and 10cwt. per acre over a quarter of the farm annually. The total quantity of lime applied over the last 4 years now varies between 2 tons and 2½ tons per acre. These applications have raised the pH of the soil to about 6.1, and it is not intended to apply any further lime in the meantime, as this figure is considered ideal for pasture growth.

IRRIGATION AND RAINFALL ON PASTURES

Season	Average quantity of water used per acre (in.)	Rainfall during season (in.)	Rainfall plus water (in.)	Time taken to apply water (hours)	Cost of of water £	s.	d.
1949–50	28.6	19.40	48.00	427	74	10	4
1950–51	13.86	32.38	46.24	241	34	13	0



Irrigation

Water is available for irrigation from the beginning of September until the end of April, and to give some indication of the quantity of water required to maintain sufficient growth on the pastures for dairying the quantities applied by irrigation and the rainfall during the 1949-50 and the 1950-51 seasons are given in the table on this page. These two seasons have been selected because in one the rainfall approximated the average for Canterbury and in the other it was abnormally high. The number of hours required to apply the water and the cost of the water are also given.

The equivalent of approximately 50in. of rainfall seems necessary during the September-March period to maintain pasture growth for the stock and also to enable sufficient hay to be saved for winter feed. The amount of water applied at each irrigation has varied between 3in. and 7in., depending on the rankness of the growth. The average applied at each irrigation would be about 5in.

The labour required to apply the water averages about 40 days of work each season.

Stock

Composition of Herd

The present herd contains several breeds, including Friesians, Ayrshire, Shorthorns, and Jerseys. Jersey bulls, however, are being used, and the ultimate aim is a herd consisting wholly of Jerseys. In the past it has been necessary to buy in replacements, but the herd has now been built up to the stage where heifer calves from the better cows can be retained, and these should be sufficient for replacement and maintenance.

Pigs

Construction of a modern piggery with suitable outside pens has been completed and the intention is to concentrate on the production of pig meat

BINDING OF
THE JOURNAL
OF AGRICULTURE

EVERY SIX MONTHS A HANDSOME VOLUME IN REXINE WITH GOLD TITLE.

Send Your Parts With Return Address and £1/5/- to:—

W. E. HOGG,
Bookbinder,
BOX 336 - - - - - WANGANUI.

NEW ANTI-RUST AGENT!

IN
"3-IN-ONE"
OIL

NEW discoveries have now made "3-IN-ONE" Oil better than ever! New rust-inhibiting agent, greater penetrating power and balanced viscosity make "3-IN-ONE" Oil the *ideal* lubricant and rust inhibitant around the home, office, workshop and garage. Buy a can *to-day!*

If you switch to

DRY DRENCHING

with "PHENOVIS"

Phenothiazine Pellets

YOU'LL DRENCH QUICKER AND MINIMISE THE RISK OF WOOL STAINING.

THIS scientific phenothiazine DRY drench has won New Zealand-wide praise.

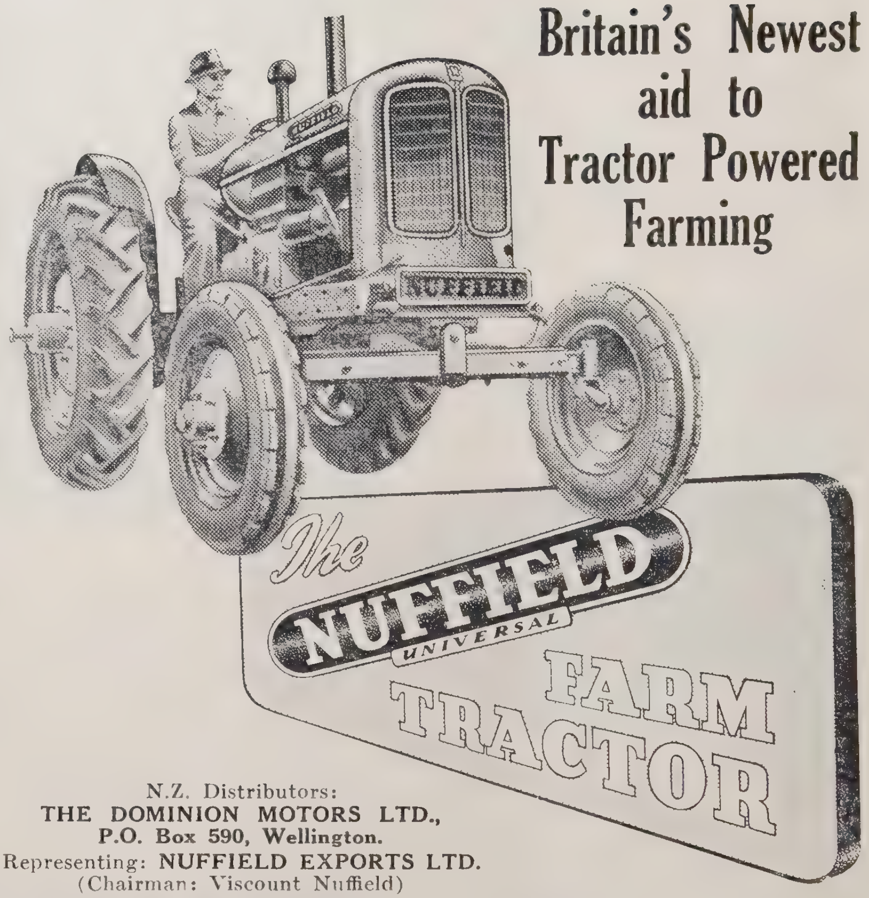
"PHENOVIS" Pellets are safe, accurate, labour-saving. Accurate dosage is certain because each contains exactly 5 grammes of phenothiazine. The dose, given by a special instrument, ensures no "spit-out" and minimises risk of wool staining during drenching. Easier to carry than heavy liquids—and there's much less chance of waste. Order now for the season ahead.

New Zealand Distributors:

SUMMIT PRODUCTS LTD.

Box 328, Palmerston North.

Britain's Newest aid to Tractor Powered Farming

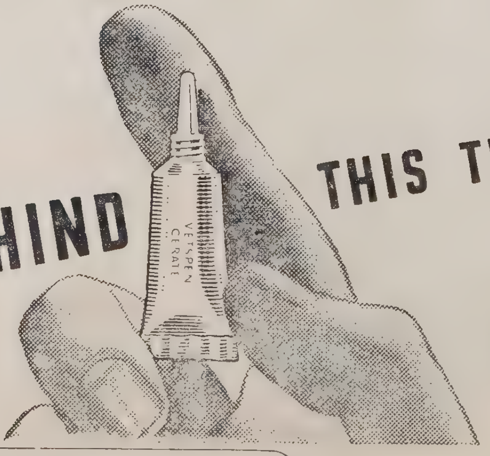


The NUFFIELD UNIVERSAL FARM TRACTOR

N.Z. Distributors:
THE DOMINION MOTORS LTD.,
P.O. Box 590, Wellington.
Representing: **NUFFIELD EXPORTS LTD.**
(Chairman: Viscount Nuffield)

A REMINDER TO DAIRY FARMERS

BEHIND THIS TUBE



of VETSPEN CERATE

Penicillin Udder Injection are all the resources of Glaxo research which pioneered the production of Penicillin in Great Britain. The same skill and knowledge which developed Penicillin for the benefit of human beings goes into the production of Vetspen Cerate, the penicillin treatment that defeats mastitis (commonly known as mammitis).

Drying Off Treatment. Examine every cow before drying off. If there is any sign of mastitis treat each affected quarter with three tubes of Vetspen Cerate—one daily at 24 hour intervals. Use the third tube after the last milking.

Vetspen Cerate has been proved by thousands of farmers during 3 seasons.

Price: 13/6 per dozen tubes.

GLAXO LABORATORIES (N.Z.) LTD., PALMERSTON NORTH

as much as possible. Seven sows—1 to every 10 cows—are now being carried and it is expected that it will be possible to produce 80 to 100 porkers annually. In the 1950-51 season 64 porkers were sold. To produce the number of porkers aimed at it will be necessary to carry a number of store pigs through the winter. This can be done economically with grain and meat meal plus roots grown on the farm. The sows are Tamworth-Berkshire cross and the boar is a Large White.

Stock Health

No serious stock diseases have occurred on the farm. There have been cases of cows slipping their calves and also cases of mastitis, but nothing unusual. The worst disease, if it can be called a disease, to contend with is bloat. Irrigation tends to encourage clover growth and during wet weather a careful watch has to be kept on the stock.

It has not been necessary to cover the stock during winter. Even with the cold conditions experienced and the lack of shelter the stock have always come through the winter in splendid condition.

Rearing of young stock for herd replacements has presented no problems. Two-year-old heifers coming into the herd this season are well grown.

Butterfat Production

Four seasons have now been completed and the butterfat returns (factory figures) are as follows:—

Season	Number of cows milked	Butterfat lb.
1947-48	27	4,828
1948-49	45	7,860
1949-50	60	15,594
1950-51	66	18,538

Substantial increases in butterfat produced have taken place from season to season as a result of both pasture improvement and herd improvement. Both the pastures and the herd are capable of still further improvement, and expectation of a production of 22,500lb. of butterfat, or 150lb. per acre, does not appear unduly optimistic. This figure would compare very favourably with the findings of a survey conducted in Waipa County in 1946-47 by W. M. Hamilton and K. J. Mitchell of the Department of Scientific and Industrial Research. The survey covered 850 dairy farms and the butterfat production per acre averaged 138lb.

Some of the dairy herd wintering on swedes.

The effect of irrigation in evening out monthly butterfat production is well illustrated in the following table.

	Butterfat (lb.)	
	1949-50	1950-51
August	335	832
September	1,530	1,816
October	2,091	2,706
November	2,090	2,494
December	2,081	2,455
January	1,918	2,354
February	1,684	2,008
March	1,569	1,842
April	1,053	1,268
May	724	678
June	186	85
July	233	—

The relatively high butterfat production maintained during December, January, February, and March is entirely due to the maintenance of grass growth brought about by the application of water.

Winter Feed

With grass growth almost negligible from May until September the provision of ample winter feed becomes an important aspect of dairying on light land with irrigation. Stock have always wintered particularly well on this farm, however, and a possible explanation is that they always go into the winter in very good condition owing to the fact that grass growth can be maintained well into April by the use of irrigation.

Hay is the main winter supplementary feed. It is the practice to provide 1 ton of hay for each head of stock carried. This hay is obtained mainly from pasture growth, but lucerne is being grown and the area in it expanded as opportunity offers. From the pasture growth 60 to 90 bales per acre are obtained; the lucerne provides about 120 bales per acre in four cuts.

As a means of pasture renewal swedes have been grown during the past 2 years, and success with them has varied from good to indifferent. It has been shown, however, that provided sufficient hay is available, root crops are not essential. They are necessary, however, for the wintering of pigs.

Provision of Early-spring Feed

The spring flush of grass growth does not take place until about the middle of September. With calving arranged to start about the beginning of August, there are 6 weeks when feed must be provided for the newly calved cows. It is usual to close several paddocks about the middle of March, and the feed produced in the autumn is carried through the winter for the cows in the spring. Rationed on this winter-saved grass and lucerne hay, the cows milk very well. The paddocks sown with short-rotation ryegrass have proved the most suitable for the production of winter-saved grass.

Dairying Has Possibilities

After 5 years the carrying capacity of the farm has been built up to 80 milking cows plus replacements. In the 1950-51 season 18,500lb. of butterfat were produced and with further improvements both in the quality of the herd and the pastures this figure could no doubt be increased to 22,500lb.

Experience has shown that the winters are not too severe for dairy stock and that sufficient winter feed can be grown.

It has been shown further that the major portion of the work on the unit can be carried out by two men.

Dairying on light land with the aid of irrigation has possibilities, but while the returns from sheep products remain so high dairying is unlikely to be undertaken on this class of country.

View of the cowshed, dairy, and yards.

The Home Garden in April: Soil Improvement

By C. L. NAPIER, Orchard Instructor, Department of Agriculture, Hastings

AS many plots will be cleared of crops during April, gardeners would be wise to give attention to the replenishment of humus in their soil by adding organic matter in the form of green crops, compost, and other materials. Humus is the basis of soil fertility and plant health, and gardeners cannot hope to expect consistently good crops from their soil unless it contains adequate amounts of humus.

MANY home gardeners are finding difficulty in growing crops which, in their opinion, should be grown easily in their particular soils. Without giving due thought to the problem some gardeners attribute lack of success to attacks of pests and diseases or lack of trace elements. Though these may have been responsible, the trouble often can be traced to a soil poor in structure and generally lacking in humus.

A good soil structure is essential to efficient soil management and profitable crop production, and continuous "mining" of the soil without replenishment can only lead to worn-out soil. During April some growers will be clearing plots of crops and sowing them down to a green crop; others may be turning in a crop sown earlier or incorporating some organic material obtained outside their gardens.

Any of these forms of soil improvement is essential sooner or later, and if the gardener understands the manner in which humus assists in supplying plant foods, he is better able to ensure heavy crops.

Composition of Soil

Soil can be termed a mixture of weathered fragments of rock and organic matter of animal and plant origin. Its purpose is to provide a rooting medium for plant life and to act as a reservoir for plant foods and water. In all soils the rock fragments are in various stages of weathering and vary in size from boulders to particles of clay. Generally, a purely mineral or "rock" soil is inactive except for the clay particles in it. All stones, sand, and silt are inactive or infertile until by the process of weathering they are reduced still further in size.

Clay particles are the result of such reduction and are in a very fine state. Particles of such minute size are termed colloids. Once the particles have reached this size they assume characteristics quite distinct from all the other types. They are capable of absorbing moisture and of taking up and giving out certain important plant foods.

This characteristic of clay colloids constitutes one of the most important aspects of soil fertility. The same characteristic is present in humus, the ultimate form of organic matter after it has been broken down by soil organisms.

[*Sparrow Industrial Pictures Ltd. photo.*

Organic matter should be mixed as thoroughly as possible with the soil if rapid decomposition is required.

Importance of Organic Matter

In natural conditions organic matter is returned to the soil in the form of dead animal and plant tissue and animal by-products. Plant tissue probably constitutes the largest proportion returned. When the organic matter is broken down and in combination with the mineral portion the material commonly known as soil results. Average fertile soils contain approximately 5 per cent. of organic matter.

When deposited on the soil organic matter is immediately attacked by a varied population of soil organisms, including worms, fungi, and bacteria, which break it down to a dark brown or black product known as humus.

When present in the soil humus has several important functions and properties, the chief of which are:—

1. It increases the water-holding capacity of the soil, thus providing a useful reservoir of moisture during the dry months. It also increases the base-exchange capacity, that is, the power of the soil to hold plant foods against leaching and later to give them up when they are required by plants.

2. It increases the biological activity of the soil. If adequate supplies of organic matter are applied, micro-organisms will increase rapidly and the consequent breakdown to humus will supply important plant foods in an available form.

3. It increases the pore space of the soil, thus giving freer movement of air. This factor is important, as lack of air or restricted air about the roots of plants does not encourage healthy plant growth and in some instances may cause death. The increasing of pore space is also a safeguard against excess moisture in the soil.

4. It tends to make a soil darker, thus increasing its rate of warming in spring and its ability to retain heat during summer.

Humus disappears to varying degrees in different types of soils and under different methods of cultivation. In light soils, in soils under continuous cultivation, and in alkaline soils humus will tend to disappear much more rapidly than in heavier soils and acid soils such as peats or under circumstances where cultivation is restricted. Cultivation increases aeration and this in turn tends to reduce quickly, by oxidation, the supplies of humus.

The capacity of humic colloids for holding plant foods is many times greater than that of clay colloids, and for this reason the former are an important factor in soil fertility.

Maintaining Organic-matter Content

The importance of maintaining adequate supplies of organic matter cannot be over-emphasised. There are many sources of suitable material.

Green Cropping

Green cropping is perhaps the most common method of retaining the level

[*Green and Hahn Photography Ltd. photo.*

At this stage of growth cereals such as the barley shown provide valuable fibre for opening up heavy soils and building up light ones.

of organic matter in the soil. It is probably the most convenient method, as the material is produced on the area where it will be turned in later. Green crops can be grown at almost any time and any plot in the garden not required for vegetables for a considerable time should be sown down to a cover crop.

Green cropping has several advantages over other methods of humus replenishment:—

The root systems of the plants tend to open up the soil and make it more friable when the green crop is growing and the crop when dug in adds valuable fibre to the soil.

The growing plants draw on foods that might otherwise be lost by leaching. These foods are later released when the material rots down.

The speed of decomposition in the soil can be governed to some extent by turning in the crop at varying stages of growth. Young or immature crops tend to decompose much more readily than mature crops, because of the water content and lack of fibre.

A growing crop draws on large quantities of moisture from the soil. In a wet season this may be an advantage, as it tends to reduce the water content of the soil; in dry districts, however, gardeners should not lose sight of the fact that serious reduction of soil water could result.

The longer a green crop is left the greater will be its fibre content. This is important and should be considered in relation to soil type. Light or heavy clay soils, for instance, benefit from a considerable amount of fibre; therefore it would be an advantage with such a soil to leave the crop until it was fairly well matured. In good loams, however, a green crop can be turned in when much younger.

There are several kinds of crops which produce good supplies of organic matter. The legumes, such as lupins and peas, are valuable, because in addition to fibre they supply considerable quantities of nitrogen. There are several types of peas, including ordinary garden green peas, which are suitable for turning in. If green peas are available in quantity at reasonable cost, they can be sown broadcast and the pods picked as a vegetable before the vines are turned in. All green crops grow well in the warmer periods of the year if there is adequate soil moisture. This applies particularly to mustard and lupins, which often give a poor stand if sown too late into the autumn. Cereals such as barley and oats give good bulk of organic matter and will grow well even during the cooler periods.

Sowing and digging in: To ensure good germination of seed the soil should be reasonably firm and moist at time of sowing. Seed can be broadcast over the soil and then worked in with a rake or wheeled cultivator. It is an advantage to apply a dressing of superphosphate (about 2oz. per square yard) when sowing legumes, and an additional application of 1½oz. of sulphate of ammonia to the square yard when sowing crops other than legumes. This treatment will encourage greater production of organic matter. The manures applied are not lost, as they later become available to vegetable crops when the cover crops rot down. The various crops can be sown at the following rates: Lupins, 1oz. per 3 sq. yds.; peas, 1½oz. per

[*Sparrow Industrial Pictures Ltd. photo.*

Green crops prevent loss of plant foods which will later be released when the crops are dug in. The crop shown is of lupins and Chinese cabbages.

Valuable Book for Home Gardeners

THE most comprehensive work on home vegetable gardening under New Zealand conditions yet published is now available from main offices of the Department of Agriculture or from Whitcombe and Tombs Ltd. It is Bulletin No. 342, "The Home Vegetable Garden", by A. G. Kennelly, Vegetable Instructor, Department of Agriculture, Dunedin.

The bulletin, which contains 214 pages, including a detailed index, is well illustrated with diagrams and photographs. Apart from sections on such topics as preparation of the soil, fertilisers, and composting, the bulletin includes a chapter which deals with all the vegetables likely to be grown in New Zealand in their alphabetical order. There is, too, a very comprehensive section on pests and diseases which should enable gardeners to identify these and take effective preventive or protective measures.

"The Home Vegetable Garden" is 2s. 6d. per copy, post free.

Surest and
Best way
to combat

Mammitis

MANNINGS
PENICILLIN
UDDER INJECTION

MANNINGS
PENICILLIN
udder injection

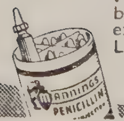
The quick, easy and effective way to deal with Mammitis is to give immediate injections of MANNINGS PENICILLIN. Keep your herd Mammitis-free with this proved treatment in the original single-squeeze tube.

Always have on hand

MANNINGS
PENICILLIN
udder injection

MANNINGS
PENICILLIN
UDDER INJECTION

Obtainable throughout New Zealand.


Mannings
PENICILLIN

Farm proved—and backed by the 60 years' veterinary experience of MANNINGS LTD., HAMILTON.

KIWI

Sheep Shearing Machine

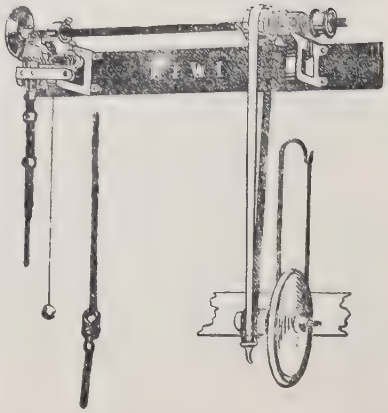
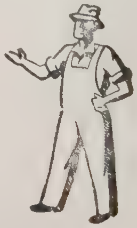


Illustration shows the
"KIWI" MIDGET MODEL

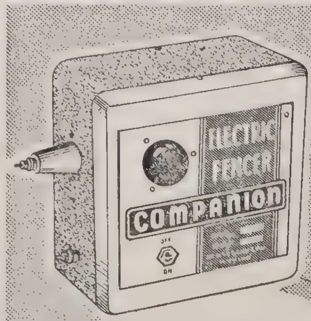
Also available—
"STANDARD"
"ELECTRIC"
and
"PORTABLE"
MODELS.



Write for full details to:—

NEW KIWI SHEEP SHEARING MACHINE CO. LTD
90 FEDERAL STREET - - - - - - - - - - - AUCKLAND

M9


ELECTRIC
FENCER
COMPANION

Rotational Grazing
made EASY!

No other method of rotational grazing is as easy — as economical. **COMPANION Electric Fences** will save you high labour costs, fence posts, wire, gates, etc. — and they're so simple to instal.

Instal **COMPANION Electric Fence Units** and prove that your farm can carry more cows per acre, give a greater yield, and earn greater profit.

AGENTS IN ALL CENTRES

Manufactured by SWAN ELECTRIC CO. LTD.,
P.O. Box 307, Auckland.

CF1.9

COMPANION ELECTRIC FENCE UNIT

3 sq. yds.; oats, barley, rye, etc., 1oz. per square yard; mustard, ¼oz. per square yard. These quantities should ensure a good bulk of growth and yet should not be heavy enough to give soft, drawn plants.

Turning in can begin at the stage of growth required by the gardener. At least 1 month and preferably 6 weeks should be allowed for the crop to break down before further planting takes place. For best results the soil should be moist and the green material should be incorporated with the soil as thoroughly as possible. Packing a thick layer of vegetation in the bottom of a trench does not provide the best conditions for rapid decomposition by micro-organisms, as air tends to be excluded. To assist non-leguminous crops in breaking down an additional light dressing of sulphate of ammonia is often an advantage. It can be applied just before the crop is dug in.

Materials for Digging in or Mulches

Animal manures, straw, sawdust, lawn clippings, wheat husks, grass seed cleanings, spent hops, and compost are some other materials that can be utilised profitably in the home garden. In all cases they can be dug in as are green crops, or they can be used on the surface of the soil as mulches.

Mulches, which have several virtues, are valuable for soil improvement and in some instances are much easier to deal with. Mulches can be applied to the soil at any time of the year, but their value as soil improvers takes longer to be appreciated, as they are incorporated in the soil slowly. If a mulch is applied in spring to reduce loss of moisture from the soil, it can be dug in in a similar manner to green crops when vegetable crops have been removed. Animal manures and straw, separately or mixed, make good mulches. Animal manures are valuable, because of their greater plant-food content, which is gradually leached down to plant roots as the manures break down. Mixtures of animal manures and straw are ideal for turning in, as the plant food content is more balanced than when the constituents are used separately and the nitrogen released by the manure encourages more rapid breakdown of the straw than takes place with straw alone.

[Sparrow Industrial Pictures Ltd. photo.

As plots become vacant they should be sown to a green crop as illustrated by these three stages of growth of lupins. In the left foreground plants are just emerging.

Straw, hay, sawdust, and other very fibrous and dry materials usually contain little nitrogen and when utilised as soil improvers should be supplemented with animal manure or a nitrogenous fertiliser such as blood and bone, dried blood, or sulphate of ammonia. Failure to do this often leads to temporary nitrogen deficiency through the micro-organisms drawing on available soil nitrogen in the process of breaking down the organic matter. Poor growth in crops can be the result. The nitrogenous fertiliser is best applied as a light dressing to the soil before the mulch is applied.

Alternatively, straw, hay, etc., can be dug in, but extra nitrogen should be added. Sawdust should be used judiciously, as its nitrogen content is very low. Too much should not be used at one time. The addition of the fibrous materials such as straw, hay, and sawdust is valuable for opening up stiff clay soils, as pore space is thereby increased, which improves both air and water movement within the soil. The same materials are also valuable on sandy soils, and if applied in adequate amounts, will increase the water-holding and base-exchange capacity of such soils, thus improving their fertility.

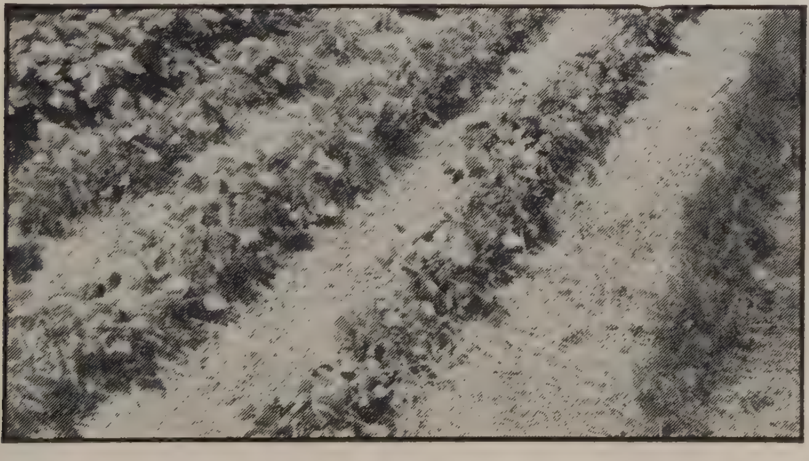
Composting

The generally accepted meaning of composting is reducing raw organic matter to humus before applying it to the soil. This definition is not strictly correct, as mulching with organic materials is often termed sheet composting. The value of compost, compared with other types of organic matter, lies in its more quickly available plant-food content. As there is no danger of nitrogen deficiency developing if compost is well matured, it can be applied safely at any stage of plant growth. If applied as a mulch, compost will gradually improve the mechanical condition of the soil, but to have any appreciable effect it must be applied in considerable quantity. A 5 to 6 weeks' lapse between digging in and planting is not necessary with well-made compost as with green crops or other forms of crude organic matter dug in.

Gardeners should realise that an occasional application of organic matter does not have any appreciable effect in improving the soil either in structure or fertility. To bring about the desired improvement gardeners must incorporate organic matter in the soil regularly. Nature provides a striking lesson in the bush, where a cycle of plant growth, death, return to the soil, and decay goes on continuously. There, nothing is removed and nutrients are provided for the next generation. Home gardeners should strive for a somewhat similar balance between what is grown and removed from the soil and what is returned.

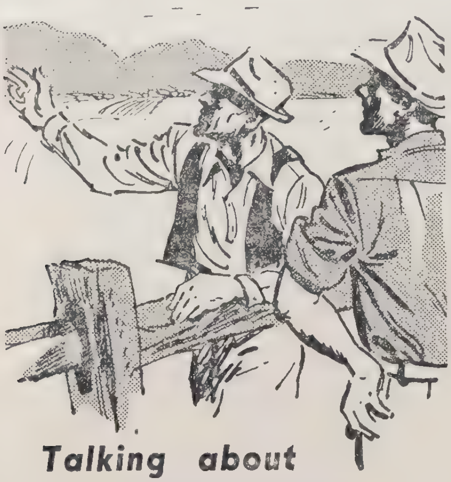
Garden Work for April

In April there will be a considerable reduction in seed sowing, except in districts having a fairly mild autumn climate. As air and soil temperatures fall conditions for seed germination become less favourable and consequently results are not always heartening. Where seed sowing is to be attempted, it is wise to



[R. W. Orr photo.

Mulches of straw applied to retain moisture during summer can be dug in later to improve the soil.



Talking about FERTILIZER

Fertilizer is costly—it is important that the price you pay should not be further increased by out-of-date packaging methods. **Bates Multiwall Paper Bags,** being lower in price, have helped substantially in keeping your fertilizer prices down.

Fertilizer is scarce—it is vitally important that not one bit should be wasted through siftage and adhesion. **Bates Multiwall Paper Bags** are sift-proof; the many walls make them practically tear-proof; fertilizer will not cling to the paper.

Topdressing is a dusty, time-consuming and irksome job—it is just sound sense that it should be made as easy and quick as possible. **Bates Multiwall Paper Bags** are easier to stack; easier to carry; quicker to open; quicker to empty. All these benefits can be yours if you buy your fertilizer in **Bates Multiwall Paper Bags.**

Are You Enjoying the Advantages of

MULTIWALL

PAPER BAGS

Manufactured to Bates-St. Regis Specifications.

Address enquiries to the Manufacturers

N.Z. FOREST PRODUCTS LTD.
(Multiwall Bag Division)
PENROSE - - AUCKLAND

It pays to build and repair your own FARM BUILDINGS

PERMANENT
FIRE-PROOF
WEATHERPROOF
ECONOMICAL
ATTRACTIVE

★

Do it yourself

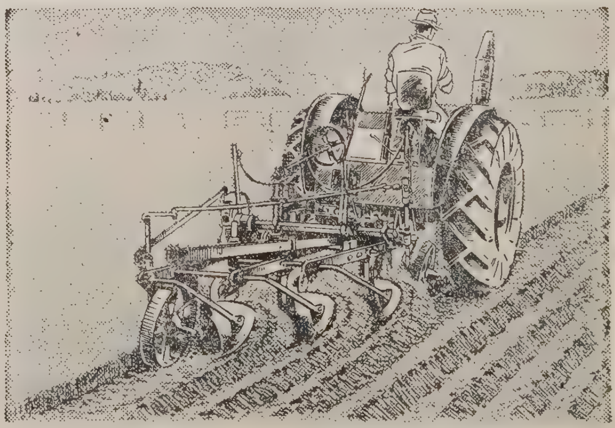
★

Requires no maintenance

WITH Durock ASBESTOS-CEMENT SIDINGS

Distributed throughout New Zealand by:
DOMINION SALES CORPORATION LTD.,
Auckland—Wellington—Christchurch—Dunedin

REID & GRAY *serve the man on the land*



3-FURROW
SILVER
TRAILER
PLOUGH

With a wealth of local experience behind them, Reid & Gray today produce ploughs to meet every kind of New Zealand condition . . . Tractor-trailer ploughs, and mounted ploughs for "Fordson" Major and "Nuffield" Tractors. With these and other farm implements of equally high standard, Reid & Gray are confident of the service they can offer.

REID & GRAY LTD.

Head Office & Works: **Burnside, Otago.**
Branches at: Invercargill, Gore, Balclutha and Dunedin.

AGENTS— **Auckland:** Alfred Buckland & Sons Ltd.; **Hamilton:** Newton King Ltd.; **Gisborne:** Tractor & Machinery Co. Ltd.; **Palmerston North:** Reid & Gray Agency Co. Ltd.; **New Plymouth:** J. B. MacEwan & Co. Ltd.; **Masterton and Nelson:** Levin & Co. Ltd.; **Blenheim:** R. Cresswell & Sons Ltd.; **Greymouth:** Greymouth Motors Ltd.; **Christchurch, Ashburton, Timaru, Waimate and Oamaru:** National Mortgage & Agency Co. of N.Z. Ltd.

construct raised beds, if there is any danger of a high water-table during winter.

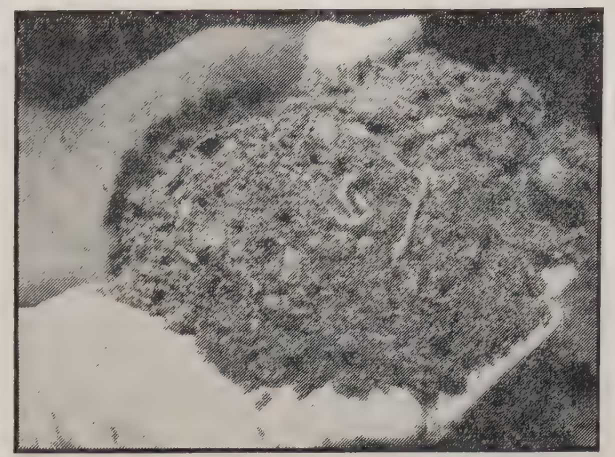
Asparagus: Once the top growth of asparagus has begun to change colour and turn brown it can be removed and composted or burnt. Removal of growth before the seed falls will prevent the establishment of many seedlings the following spring. After the fern growth has been removed opportunity should be taken to remove any weeds established during the season and to mulch the bed with stable manure. A mixture of poultry manure and straw or sawdust is a good alternative to stable manure.

Broad beans: In favourable localities an early sowing of broad beans can be made, but gardeners should remember that very early crops do not always set as well as later crops. Broad beans do well in soils with a good supply of organic matter, and drainage should be good so that rotting of the seedlings does not occur during winter and spring rains. Two main types of broad beans are grown in New Zealand, the broad-podded or Windsor type and the long-podded type. Although the Windsor type is considered to have a superior flavour, the long-podded type usually bears earlier. Giant Windsor and Broad Windsor are popular broad-podded types and Early Long Pod and Mammoth Long Pod examples of the long-podded type.

Tomatoes: In districts where frosts are expected in April, late-planted tomato plants should be covered at night to allow all available fruit to develop. Small quantities of foliage can be removed from about trusses to allow the extra light to aid ripening. However, this should be done with discretion, as the removal of foliage may even check development and expose the fruit to damage by sun or frost. If it is thought advisable to harvest all fruits, the whole plants can be pulled and hung up by the roots in a dry, warm, sunny position to allow as many fruits as possible to ripen.

Pumpkins, squashes, and marrows: If grown for winter storage, these crops should be selected carefully and harvested as they mature; details were given in the February issue of the "Journal". In districts with mild autumns some vines may still be developing and applications of liquid manure may be necessary to hasten development of the fruit.

Rhubarb: As soon as summer rhubarb ceases active leaf production opportunity should be taken to overhaul the beds. If the clumps are old, they can be lifted, trimmed, and planted elsewhere. Rhubarb is a gross feeder, and if left in the one position too long, will tend to become weak. Old clumps are often hollow, but can be rejuvenated by splitting them before replanting. It is best to lay the lifted clumps under a hedge or other suitable position for the winter and cover them with straw or dry soil till sprouting occurs.



[*R. W. Orr photo.*

Organic matter provides essential foods for micro-organisms and when broken down by them gives soil the good crumb structure of the compost shown.

The new bed can be prepared during winter. It should receive liberal quantities of compost, rotted stable manure, or other similar organic matter. As soon as good, plump buds develop on the clumps they can be split. A sharp spade is the handiest tool for this purpose. Only the youngest portions of roots, each with a crown attached, should be kept and all old portions discarded. When replanted, crowns should be covered with about 2in. of soil.

New plants of rhubarb can be produced easily from seed from established plants. Seed, which should be well ripened, should be sown thinly in early spring in a similar manner to other vegetables. Plants should be transplanted at greater distances the following spring and final selections made from these. Some good strains of rhubarb can be produced in this manner.

Cabbages and cauliflowers: Plantings of spring cabbages can now be made in well-drained plots enriched with organic matter. Plants should be selected carefully from seedlings raised earlier and the plants lifted so that roots are damaged as little as possible. Cauliflowers sown earlier can be planted out in districts with a fairly mild climate. As plants should not receive a check, growing conditions will not be suitable in all districts. In the least favourable districts it is best to make plantings about July and August. All seedlings should be firmly heeled in after planting to ensure quick root production.

[*Green and Hahn Photography Ltd. photo.*

Sawdust opens up heavy soils and can be used as a mulch or dug in immediately.

Reminders

Onion seed should be sown if not sown in March. Pukekohe Long Keeper, Brown Spanish, and Straw Spanish, are good varieties.

In some favourable coastal districts carrots may still be sown.

Tubers and root crops should be harvested as described in the February issue of the "Journal".

In favourable localities a sowing of spinach should produce greens before the winter.

Lettuce plants can still be set out, but to obtain all possible warmth, raised beds should be made.

The dead tops should be removed from Jerusalem artichokes and the tubers left in the ground or lifted, according to local soil conditions.

Celery not already blanched and leeks should be earthed up.

The garden should be kept free of weeds and all available vegetable refuse and rubbish should be composted or dug in. All diseased vegetable refuse is best burnt; the ash can be stored in a dry place for use later as a fertiliser.

Surplus peas and beans should be harvested as outlined in the January issue of the "Journal".

Remaining crops of onions and shallots should be harvested as described in the February issue of the "Journal". Bulbs probably will have to be dried under shelter at this time of year.

A watch must be kept for late attacks of pests and diseases on autumn and winter crops and preventive measures should be taken before appreciable damage is done.

Closing Down of Hives and Storage of Winter Feed

Seasonal Notes for the Domestic Beekeeper

By S. LINE, Apiary Instructor, Department of Agriculture, Invercargill

THE period in which bees are active is now drawing to a close, when all honey in domestic apiaries that is to be extracted should be off the hives. Commercial beekeepers may have a "hot-room" in which to store supers of cold honey to be warmed for several hours or even days and are not so dependent on the heat of summer to do their extracting. However, the domestic beekeeper cannot afford to wait long into the autumn, otherwise difficulty will be experienced in extracting cold honey. Any honey remaining on the hives may be evenly distributed among the hives as winter feed or stored away in a dry place for feeding to bees that become short of stores during winter.

A GOOD practice during earlier months was to have put aside as a reserve combs of honey (in the process of uncapping) that looked darker than the main body of honey extracted, for use especially during the following spring, when bees may be on the verge of starvation. Any combs that have been through the extractor and where honey is so thick that it fails to come out of the comb should be stacked away in supers placed on trays to catch any drips. Absorption of moisture may cause the combs to "weep" and if columns of supers are not stacked on special metal or wooden trays, a honey house floor can become saturated in places, thus causing fermentation to become established.

Emptying of Tanks

Any honey still being extracted is likely to granulate quickly in the tanks, so that processing will need to be given closer attention than in warmer weather. Wax particles and especially any black specks of comb should be skimmed off quickly and a starter of smooth-grained honey stirred into the body of liquid honey so that in the event of a very cold or frosty night the honey will thicken and granulate evenly and minimise the chance of coarse crystals becoming noticeable when the honey is run into containers. A thing to be guarded against during cold nights is honey setting hard in a tank. If by some oversight the beekeeper has not ordered his requirement of small honey containers well ahead and is therefore short, it will be necessary to empty the tanks into 60lb. tins, of which there should always be enough on hand for any eventuality. These tins are useful if a beekeeper wishes to empty tanks quickly or if a larger crop is gathered than was expected.

Storing Combs in Winter

The method of storing extracted combs in winter will depend partly on whether there has been any foulbrood in the past in the apiary. Beekeepers with a few hives may find it practical to mark the hives and supers extracted and by keeping or returning the frames to their respective hives for cleaning up the danger of spreading disease is reduced. The mat over the brood nest is partly turned back so that without chilling the lower part the bees may have access to the wet combs and take the residue down below. There is an element of risk in placing supers of extracted wet combs outside in an exposed condition for all the bees around to clean up, as robbing may become a problem, and there is also the possibility of spreading bee diseases.

Mice and Wax Moths

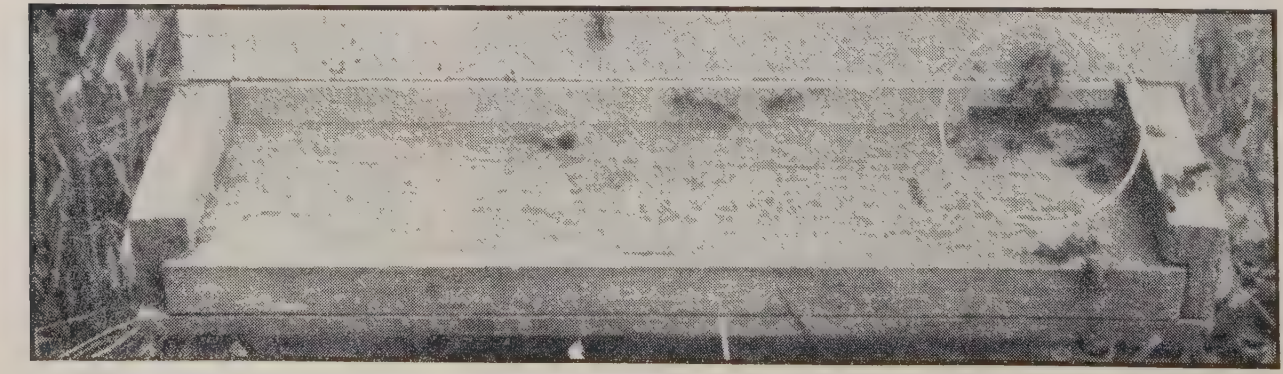
Mice and wax moths must be prevented from destroying the combs. Supers of extracted combs represent a considerable part of the outlay in beekeeping, and the damage a mouse could do in a column of supers in one night would easily run into pounds. If there are any faults or unevenness in the flooring that supers are stacked on, a queen excluder or wire screen should be placed over the top and under each column. In most cases wax moths can be warded off by placing a level dessertspoonful of naphthalene on a piece of paper under the base of each column. Where there are signs of the wax moth having already entered the comb, calcium cyanide in powder form would be a better deterrent, using 1 tablespoonful on a piece of paper placed under each stack. Where fumigants are used, however, the storing place for supers should be in another building or well away from where honey is being handled so that no foreign odours are absorbed while honey is being processed or tinned off.

Wintering of Hives

Preparatory to wintering down hives it will be necessary to provide a number of fresh mats to replace damaged ones. Although some beekeepers consider bees winter better without mats, the action of tugging or jerking off roofs that have become cemented down with propolis is disturbing to the bees and they are likely to be more vicious when feeding is necessary. During late autumn field mice will endeavour to find a quiet corner within a hive with consequent damage to combs, and entrance blocks or strips of wood should be on hand with a slot cut out that is no deeper than 5/16in. and 2in. to 3in. long. Where the bottom board has settled down in the earth or become lop-sided it should be raised and straightened up to allow reasonable air-space underneath. A slight slope should be given toward the entrance to drain away water that can accumulate on bottom boards in wet weather. A problem in some districts is to eliminate condensation and wet mats, but if a method is used that provides space under the roof so that air may circulate, the mats will be found to be drier than where a lid is close fitting and tight down on the mat. Hives will be more easily attended to if left 2 storeys high for the winter and if they contain about six full combs of honey in the upper box.

Shelter for Apiary

A breakwind such as a manuka scrub fence is desirable for hives if they have not shelter from a hedge or belt of trees, as during sunny days the warm, still air will encourage bees out for a little exercise and "cleansing flights". From the time that bees form a compact cluster they should not be disturbed; they are depending on their combined warmth for survival during the winter period in most parts of New Zealand and only frames outside the cluster should be manipulated.



[*Elmwood Studios photo.*

Smaller hive entrances for winter reduce the danger of robbing and prevent mice entering and damaging comb.

Building and Fitting Out a Laying House for Household Poultry

IN the February issue of the "Journal" the siting and planning of a laying house for a household poultry flock were described. This article by the Livestock Division deals in detail with some of the aspects of building a laying house and the fittings required. Attention to detail and care while building may well lengthen the life of a house and give added comfort to the birds, resulting in increased egg production.

THE laying house floor may be concrete, wood, or earth. Concrete may be considered a first choice because it is hygienic, easily cleaned, and permanent, and a concrete floor is easy to disinfect for disease-control purposes. It can be kept dry and is not cold for the birds if it is adequately covered in a suitable litter such as straw.

Wooden floors raised well above ground level are satisfactory provided they are well constructed of seasoned timber. They can be both preserved and thoroughly disinfected by an annual dressing of creosote. Earth floors involve no or little cost and can be satisfactory if they are carefully looked after, particularly if well rammed in the beginning. This type of floor is not easy to disinfect and is more difficult to deal with when an outbreak of infectious disease occurs. Generally, earth floors are not recommended, because they are often neglected and ultimately become detrimental to the health of stock.

Concrete Floors

When a concrete floor is being laid several points have to be considered. First, the level of the floor inside the house should be 4 to 6in. above the level of the surrounding ground. This is important if the floor is to remain dry throughout a wet winter, particularly on heavy, water-retentive soils or where water may run down a slope toward the laying house.

Second, it is desirable to build up a core of rubble, stones, or clinkers under the floor to prevent moisture rising to the surface of the floor from moist or wet ground underneath. Third, a smooth finish to the surface of the floor to assist cleaning is essential. This may be obtained by finishing off with a rich mixture of fine concrete and carefully grouting over the surface. Finally, it is wise in many instances to take precautions against rats burrowing under the floor, where once established they may be difficult to dislodge or may even cause breaking up of the floor. Protection may be given by dropping fine-mesh wire netting 14 to 18in. deep in a trench round the outside edges of the concrete, taking care to turn about 6 to 8in. of the netting outward at the bottom. This helps to prevent rats burrowing under the netting.

Wooden Floors

The essentials with a wooden floor are to ensure that the boards are tightly clamped together and to raise the floor at least a foot above ground level. The latter precaution ensures that plenty of air flows under the boarding, preventing dampness and ultimate rotting; also the space between the floor and the earth makes it possible to dislodge rats which may settle under the house.

Wooden floors are dry and warm in properly ventilated houses.

Building Material

The material used for the walls of the laying house will depend largely on availability and the expense the householder is prepared to incur. Wood of varying grades is commonly used and is entirely satisfactory if preserved by the regular use of creosote or paint on the outside of the house. For the inside creosote should not be used, as it will darken the interior. Birds respond to lightness in a house and are more active where the walls are lime-washed than where they are creosoted.

Reminders for April

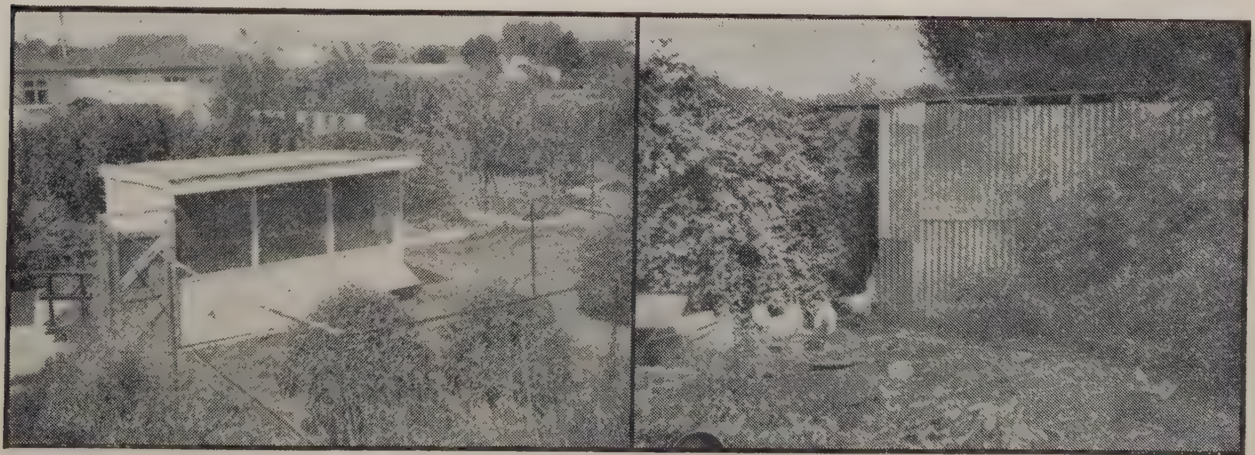
With the new-season pullets well settled and in lay the litter in the house should be built up to a depth of 4 to 6in. A good bed of dry litter must be established before winter wet weather comes. Litter should not be changed during winter unless it is absolutely essential.

Pullets in lay need standard laying mash No. 1 **(not No. 2)**, which contains 10 per cent. of meat meal.

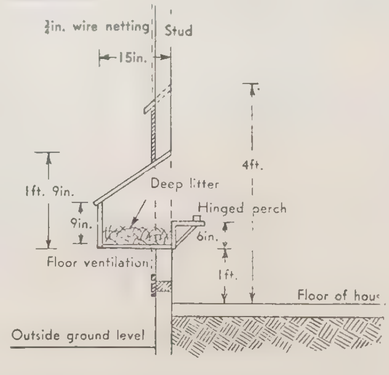
Unless ample supplies of good greenfeed are available, the new pullets should be receiving a regular supply of fish oil containing vitamin A. Details of the feeding of fish oil to laying pullets may be obtained from the Department of Agriculture, P.O. Box 2298, Wellington, ~~or~~ any office of the Department on application.

Asbestos sheeting makes excellent walls for fowlhouses, being hygienic, lasting, and light in colour. Care must be taken, however, not to subject the sheeting to heavy knocks, as it tends to become brittle with age. An attractive laying house requiring the minimum of maintenance can be built with asbestos sheeting for the walls and corrugated asbestos sheeting for the roof.

Corrugated-iron roofs have a long life and are highly satisfactory if sarking is placed underneath to prevent radiation of heat and cold. Corrugated asbestos is equally satisfactory and lasting. Roofing felt can be satisfactory if it is carefully laid and subsequently dressed at regular intervals with tar containing some pitch. Such a surface is often dusted



Contrast in poultry houses. Left—This house gives excellent ventilation and light for the birds. There is ample run space, and the bushes give shade in hot weather. Right—This house gives neither ventilation nor light. Note the unhygienic conditions.



Section through exterior nest box.

over with sand. However, felt roofs, unless of the best quality and regularly maintained, have not a long life and can cause endless trouble in wet, windy weather.

Ventilation

Good ventilation without draughts is an essential to any efficient poultry house. Birds require comfort but not coddling. Stuffiness can as easily be responsible for colds as can draughts. For this reason attention is drawn to the necessity of providing ventilation at the roof eave at the back of the house. This can be done by having a 3 to 4in. gap at the eave which may be baffled by an outside board or left open, according to the district and the winds experienced.

Inside Fittings

The essential inside fittings include perches, watering facilities, and nest boxes, and instructions for making these are given here.

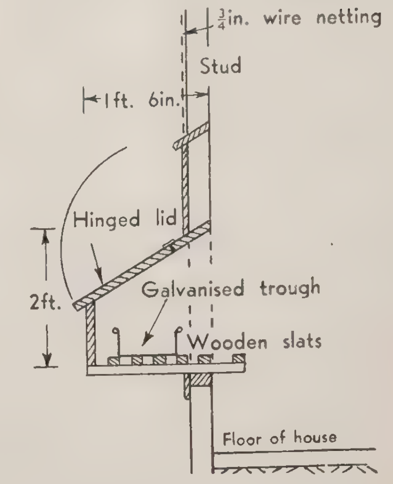
Perches

Perches should be made of 3in. x 2in. dressed timber placed on edge with the two top edges bevelled to facilitate the birds gripping the wood when they are perching and to prevent injuries to the feet. Where dropping boards are used they should be about 2ft. from the floor (or 20in. above the litter) and the perches placed 6 to 8in. above the dropping boards. If no dropping boards are used, the perches should be about 20in. above the top of the litter. The method of fitting a perch is important, as, if it is resting on a wooden bearer, there is every possibility of red mites collecting between the surfaces of the perch and the bearer. (Reference will be made to the control of red mite in a subsequent article.) Consequently, perches may be suspended from the roof on wires or placed on iron fittings rising from the floor, with distinct advantage to the birds. Where dropping boards are used the perches can be fitted to iron spikes. If a wooden bearer is used, the perch should not be made a permanent fixture, but should be a loose fitting in a slot or kept upright by a nail driven into the support or bearer on each side of the perch.

For light-breed laying birds approximately 6 to 7in. of perching room is required for each bird, and for heavy breeds 8 to 10in. for each bird.

Nest Boxes

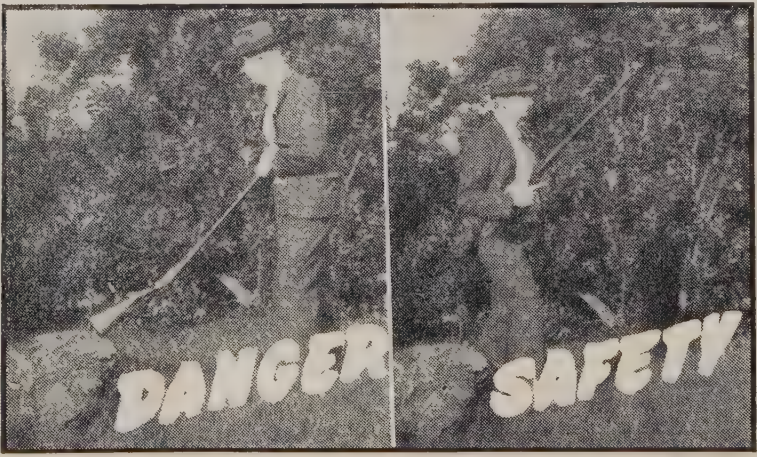
With small-unit poultry houses the fewer the fittings extending into the house the better. Consequently, a nest box built into the wall and projecting outside the house is recommended. The diagram of this type of nest on this page gives all the details required for construction. A multiplicity of nest boxes is unnecessary. One nest box 3ft. long (the size suggested for 12 to 15 birds) is as satisfactory as three nest boxes each 1ft. wide. Nesting space 1ft. wide usually is sufficient for 4 to 5 birds. If three nest boxes are fixed inside the house, they should be placed 20 to 24in. above the floor and should each be 12in. wide, 14in. high, and 16in. deep, with a 6in. lip at the front of the nest to retain the nesting litter. One nest 36in. long, 14in. high, and 16in. deep may be used instead of the three compartments. When nests are placed inside the house it is desirable to make them removable from the wall for cleaning purposes, preferably using the wall of the house as the back of the nest box. Also, the bottoms of the nest boxes may be made of fine-mesh (¾in.) wire netting instead of wood. This facilitates the cleaning out of the boxes, which should contain an ample supply of clean nesting material such as straw. A wire-netting bottom will also help to reduce the number of cracked or broken eggs, and lessen the chances of flea infestation.



An external drinking trough which prevents spilt water from wetting the floor of the house.

Drinking Equipment

It is very important that the litter in a laying house should be kept dry. Where water troughs are placed inside a house there is always the danger of water being spilt on to the litter, and extra labour is required for taking the trough outside for emptying and scrubbing out before being refilled. Therefore, it is recommended that this fitting also be built into the wall, with the trough in a box projecting outside the house. A diagram giving details of this type of trough is given on this page. Attention is drawn to the slatted floor upon which the trough rests. This arrangement permits any water spilt by the birds to fall outside the house. The box containing the trough should be at least 8 to 12in. from the floor level to prevent litter being scratched into the box and trough and falling through the slats to make a mess outside the house. A galvanised-metal trough 12 to 14in. long, 4in. deep, and 4 to 6in. wide will be suitable for a small flock of layers.



SHOTGUNS with exposed hammers are always dangerous and are especially so when uncocked. Many accidents which occur with these firearms are caused by carelessness and in many cases by stupidity, as the illustration on the left clearly shows.

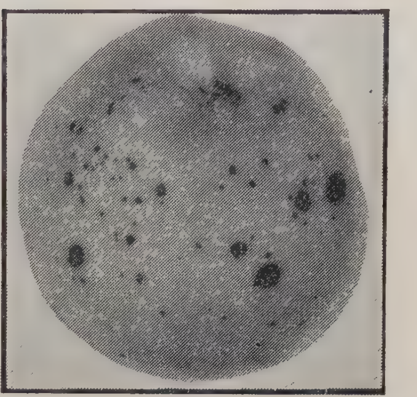
The gun shown has exposed hammers, and because of the way it is being held it could easily slip over the stump. The man's weight would force the backs of the hammers hard against the stump and they would be driven against the firing pins. In such cases a loaded gun usually discharges. A gun should always be unloaded for resting and the muzzle should never be held against the body.

A safe way of carrying the gun at the ready for dealing with game is shown in the illustration on the right. The muzzle should be pointed upward and the trigger finger should be outside the trigger guard. The hammers should be cocked, as they must be if the gun is to be of any practical use against suddenly sighted game.

Nature and Control of Ripe Spot of Apples

By C. E. WOODHEAD, Pip Fruit Specialist, Department of Agriculture, Levin, and H. JACKS, Senior Plant Pathologist, Plant Diseases Division, Department of Scientific and Industrial Research, Auckland

RIPE spot (*Neofabraea malicorticis*) continues to be responsible for part of the annual toll taken of the New Zealand apple crop by disease. As this wastage can be reduced if all apple growers adopt recommended control methods, this article describes the nature and control of ripe spot and includes an account of trials of new fungicides by the Plant Diseases Division of the Department of Scientific and Industrial Research.



["*The New Zealand Journal of Science and Technology*" *photo.*

Lesions of ripe spot on Sturmer apple; natural infection. After Taylor and Brien.

RIPE spot is caused by the fungus *Neofabraea malicorticis*. According to G. G. Taylor and R. M. Brien "the disease is first apparent as a superficial pin-point spot, light to dark brown in colour and slightly depressed. In some instances the spot may be surrounded by a red halo, but this is not a reliable diagnostic feature, as lesions with or without the red halo may be found on the same fruit. Lesions develop slowly, become dark brown to black in colour and more obviously depressed. . . ." This later stage of development, as described by Taylor and Brien, is shown in the accompanying illustration. The development of ripe spot is described by Taylor as follows:—

> Ripe spot is not an actively growing fungus like black spot or bitter rot and fruit may be heavily infected without showing visible signs of infection.
>
> **This means that a line of fruit which only appears to be lightly infected at picking time may actually be heavily infected, and for every visible lesion 30 or 40 may develop after several weeks in store.**
>
> Ripe spot lesions develop slowly and fruit showing infection may be held for several weeks after picking without the spots causing any economic damage (other than unsightly appearance) to the fruits. When the fruit reaches a certain stage of storage maturity the fungus spreads more rapidly and in cool store often provides a point of entry for soft rotting fungi.

Control Methods

Effect of Fruit Maturity on Development of Ripe Spot

Experiments carried out by the Plant Diseases Division have shown that, excluding spraying, the chief factor controlling the development of ripe spot after infection is the maturity of the fruit. In short, the more mature the fruit is when picked or when it enters the cool store the greater will be the development of the disease.

It is possible therefore to control ripe spot to a very considerable extent by early picking, quick dispatch to cool store, and holding the fruit in cool store at the lowest possible temperature consistent with maintaining the variety in good storage condition.

In practice, however, the date of picking is governed by labour, weather, and the maturity requirements of the variety as affecting fruit quality. Further, circumstances beyond the grower's control, including inadequate local cool storage, may at any time prolong the interval between harvest and cool storage and thus hasten the maturing of the fruit.

Spraying

Though any procedure that delays fruit maturity also checks development of ripe spot, it does not protect the fruit against infection. Taylor reported that the evidence of spraying trials indicated that the period of maximum ripe spot infection occurs before the beginning of harvest and that the critical period of ripe spot control is from mid-January to mid-February.

Fruit can be protected against infection only by spraying. That this is effective has been shown by Taylor in trials in which summer Bordeaux sprays reduced visible ripe spot at harvesting to as little as 3 per cent., compared with 34 per cent. in fruit that had received sulphur sprays.

There is also ample evidence from experiments by Plant Diseases Division that summer Bordeaux sprays are very effective in checking the later development of ripe spot in cool store. In a series of cool store trials the number of Bordeaux-sprayed fruits showing ripe spot ranged from 7 to 16 per cent., compared with 33 to 62 per cent. in sulphur-sprayed fruits.

Trials with New Spray Materials

Tests of promising new fungicides for the control of ripe spot have been carried out by the Plant Diseases Division over the last 3 years, the earlier trials being laid down by Taylor, formerly an officer of the Division. Materials tested were as follows:—

1. Bordeaux mixture, applied at 2 : 6 : 100 in mid-January and 1 : 2 : 100 in mid-February. To each spray was added 8oz. of casein-lime spreader, consisting of a mixture of equal weights of casein powder and hydrated lime.
2. Fixtan (3.75 per cent. phenyl mercury compound).
3. Zerlate, containing 70 per cent. ziram (zinc dimethyl dithiocarbamate).
4. Zirospray (70 per cent. micronised ziram).
5. Fermate, containing 70 per cent. ferbam (ferric dimethyl dithiocarbamate).

The new fungicides, all wettable powders, were tested at two concentrations and there were two applications at each concentration. The timing of applications was similar to that of Bordeaux sprays.

Other treatments consisted of checks not receiving any fungicidal spray and a general spray schedule consisting of usual spray treatments, including lime sulphur, colloidal sulphur, lead

EFFECT OF SPRAY APPLICATIONS IN MID-JANUARY AND MID-FEBRUARY ON CONTROL OF RIPE SPOT

Treatment	Concentration in 100 gals. water	Mean percentage infection (or equivalent angle)							
		Trial 1 (Sturmer) % infection		Trial 2 (Sturmer)				Trial 3 (G. Delicious) Harvested in May	
		Harvested May	Stored 1 mth.	Harvested in May		Stored 3 mths.			
				% Infection	Equiv. angle	% Infection	Equiv. angle	% Infection	Equiv. angle
Check	—	40.3	46.5	22.3	29.7	85.1	67.3	—	—
General spray schedule	Lime sulphur 0.5 gals., colloidal sulphur (40%) 2lb., hydrated lime 3lb., lead arsenate 1.5lb.	—	—	—	—	—	—	72.1	58.2
*Bordeaux mixture	2:6:100; 1:2:100	16.3	21.1	4.1	11.6	32.8	34.5	43.8	41.6
Fixtan	1lb.	23.6	21.2	—	—	—	—	—	—
Fixtan	2lb.	—	—	6.0	14.2	54.2	47.3	—	—
Zerlate	1.5lb.	19.9	23.4	—	—	—	—	—	—
Zerlate	3.0lb.	—	—	6.5	14.7	27.1	31.4	—	—
Zirospray	1.5lb.	—	—	—	—	—	—	38.7	38.4
Zirospray	3.0lb.	—	—	—	—	—	—	3.6	10.9
Fermate	2.0lb.	28.7	26.9	—	—	—	—	—	—
Fermate	3.0lb.	—	—	4.4	11.9	45.4	42.3	—	—
Difference required for significance at 5 per cent. level		6.7	6.7	—	4.1	—	7.8	—	9.6

* This treatment caused spray injury as outlined in text.

arsenate, and hydrated lime. Either of these treatments was used in assessing the relative efficiency of other materials tested.

Experimental layout comprised five replications of each treatment randomised in blocks, each replication consisting of three trees.

Ripe spot and spray injury were recorded from one sample case per tree at harvest, the sample consisting of the top layer of all cases picked from the tree. Fruit was sorted into that free from ripe spot and that having one or more lesions. A similar sample was also cool stored and records were taken the following spring. Considerable difficulty was experienced in distinguishing between light ripe spot infection and spray injury on fruit sprayed with Bordeaux mixture. Results were submitted to statistical analysis.

Data are given in actual and transformed figures in the table on the previous page.

Under the conditions of the tests the table shows that all treatments as compared with checks or general spray schedule gave significant reduction of ripe spot infection. Differences between treatments other than checks and general spray schedule were as follows:—

Trial 1: Bordeaux mixture gave significantly lower incidence of ripe spot at harvest than either Fixtan or Fermate. Zerlate also gave better control than Fermate. After storage, however, differences between the above treatments were no longer significant.

Trial 2: Differences were not significant at harvest, but after storage Bordeaux and Zerlate gave a significant reduction of ripe spot infection as compared with Fixtan and Fermate.

Trial 3: Zirospray at 3lb. in 100 gallons of water gave highly significant results when compared with Zirospray at 1.5lb. or Bordeaux mixture.

Bordeaux mixture caused the usual type of russet and light to severe blemish (red stipple markings) of fruit, which was very similar to ripe spot damage. Bordeaux spray residues were also difficult to remove. In other treatments fruit was much brighter and smoother skinned than that from Bordeaux plots. In Fixtan (2lb. in 100 gallons of water) plots occasional fruit showed slight red coloration and russet round the calyx.

In general, from the experimental evidence presented here materials based on Ziram were equal and in one instance superior to Bordeaux mixture in reducing ripe spot infection.

The following spray treatment is recommended by the Department of Agriculture for control of ripe spot:—

Mid-January, Bordeaux 2 : 6 : 100.
Mid-February, Bordeaux 1 : 4 : 100.

To each spray should be added 8oz. of casein-lime spreader.

Materials based on Ziram are also recommended for trial by fruit growers, application to be made in mid-January and mid-February. The concentration of Ziram used should be 1.4lb., hence materials containing 70 per cent. of Ziram should be applied at the rate of 2lb. in 100 gallons of water.

Acknowledgment

Thanks are expressed to Mr. J. M. Thorp for permission to conduct a trial on his property and for valuable assistance with spray applications.

Literature Cited

Woodhead, C. E. (1950): "The Orchardist of New Zealand", vol. XXIII No. 11, pp. 7-9.

Taylor, G. G., and Brien, R. M. (1943): "The New Zealand Journal of Science and Technology", vol. 25, No. 2 (Sec. A), pp. 63-72.

Taylor, G. G. (1944): "The Orchardist of New Zealand", vol. XVII, No. 2, pp. 3-5.

Taylor, G. G. (1946): "The New Zealand Journal of Science and Technology", vol. 28, No. 2 (Sec. A), pp. 139-144.

Taylor, G. G. (1946): "The New Zealand Journal of Science and Technology", vol. 27, No. 6 (Sec. A), pp. 457-469.

Pedigree Sow Records

In the period April 1950 to December 1951 the following breeders had pig litters graded as shown:—

Owner's name and address	Herd book number		Number of pigs		Litter weight		Grade of litter
	Sow	Sire	Born	Weaned	3 weeks lb.	8 weeks lb.	
	Berkshire						
Ayson, W. R., Otautau	22147	22907	8	8	105	316	2
Ayson, W. R., Otautau	22147	9458 (L.W.)	11	11	132	378	1
Hodgkinson, H. E., Westland	23921	25161	14	10	126	417	1
Hodgkinson, H. E., Westland	25758	25161	9	8	116	327	2
Hodgkinson, H. E., Westland	23921	25161	16	8	124	332	2
Pohangina Pig Club, Ashhurst	24968	25218	7	5	58	173	—
Pohangina Pig Club, Ashhurst	24968	25218	9	8	81	316	4
Pohangina Pig Club, Ashhurst	24968	25218	10	9	91	348	3
	Tamworth						
Smith, F. E., Hauraki Plains	16377	16781	11	9	143	399	1
Smith, F. E., Hauraki Plains	17090	17156	9	9	96	296	3
	Large White						
Barnes, A. H., Kaikoura	9670	9672	8	8	95	287	3
Barnes, A. H., Kaikoura	9671	9672	9	6	71	226	5
Bay R., Nelson	7989	7884	12	8	83	289	4
Davies, T. L., Ohaupo	7591	8520	11	11	203	522	1
Davies, T. L., Ohaupo	7788	8520	8	8	128	335	2
Davies, T. L., Ohaupo	7591	8520	12	9	179	423	1
Goymer, T., New Plymouth	7925	7567	12	10	140	482	1
Harper, R. J., Ohinewai	8405	8711	8	8	109	362	2
Harper, R. J., Ohinewai	7305	7836	14	9	132	410	1
Harper, R. J., Ohinewai	8230	8364	15	13	165	502	1
Harper, R. J., Ohinewai	8405	7836	8	6	94	299	3
Harper, R. J., Ohinewai	6343	9125	6	6	72	211	5
Harper, R. J., Ohinewai	7305	9125	14	6	84	268	4
Harper, R. J., Ohinewai	8405	9406	13	11	133	466	1
Harper, R. J., Ohinewai	7305	9125	10	9	116	413	2
Hope, W. D., Rotorua	8889	7194	8	8	98	293	3
Knight, M. H., Levin	9310	8695	9	9	85	289	4
Knight, M. H., Levin	9310	7955	12	11	143	510	1
Knight, M. H., Levin	9310	7955	16	13	152	536	1
Levin Co-op. Dairy Co.	9308	9369	14	9	64	189	—
Levin Co-op. Dairy Co.	7872	9369	10	9	99	242	4
Mundy, R. S., Whakatane	7485	8835	14	11	142	417	1
New Plymouth High School Board	7916	7567	12	9	128	339	2
New Plymouth High School Board	7909	7567	10	8	168	350	2
New Plymouth High School Board	8538 (Eng.)	7913 (Eng.)	10	9	145	372	1
New Plymouth High School Board	7916	9687	12	9	149	384	1
Pohangina Pig Club, Ashhurst	8900	8879	9	7	56	219	—
Pohangina Pig Club, Ashhurst	8900	8879	10	10	91	334	3
Pohangina Pig Club, Ashhurst	8900	8879	11	9	70	209	—
Risi, W., Hawera	8611	9009	11	9	108	329	2
Risi, W., Hawera	8612	9009	13	9	138	390	1
Risi, W., Hawera	8282	9009	8	8	121	305	2
Risi, W., Hawera	9010	8782	12	11	151	448	1

PASSION FRUIT AND PERSIMMONS

PASSION fruit and persimmons, two sub-tropical fruits which ripen from late February to April, in recent years have become more easily obtainable. Each has a distinctive flavour and is often used for flavouring, but if there are good crops, both can be used in other ways. As they ripen at a period when varieties of fruits are few, they make a welcome addition to the menu. Some recipes using passion fruit and others using persimmons are given in this article by Nell Macpherson, Rural Sociologist, Department of Agriculture, Auckland.

PASSION fruit are the more widely known and generally used. They are at their best when the skin is an even dark purple before it begins to wrinkle. Passion fruit pulp can be used raw in several ways; it can be preserved and used in fillings, icings, and sauces and as an additional flavouring in fruit salads. Either by itself or combined with other fruits it makes nice jam and spreads for sandwiches.

Passion Fruit Recipes

Passion Fruit Fool

1 pint of passion fruit pulp
1 pint of milk
5 tablespoons of sugar
2 tablespoons of custard powder

Mix the passion fruit pulp and 4 tablespoons of sugar in a bowl and leave the mixture to stand. Make a custard with the milk, custard powder, and remainder of the sugar, and allow it to cool a little. Pour the cooled custard into the passion fruit pulp and stir the mixture thoroughly. Beat it with a fork for a minute or two and pile it into individual dishes. Allow it to cool thoroughly and garnish it with whipped cream or grated chocolate.

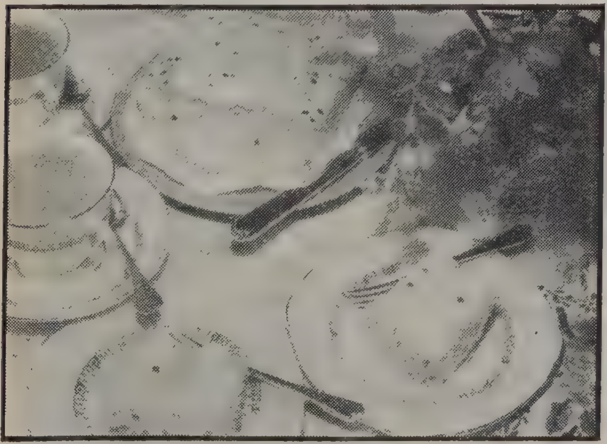
Passion Fruit Flummery

¼oz. of gelatine
1 tablespoon of flour
1 cup of passion fruit pulp
(preserved pulp may be used)
1 cup of water
⅓ cup of sugar
Lemon juice to taste

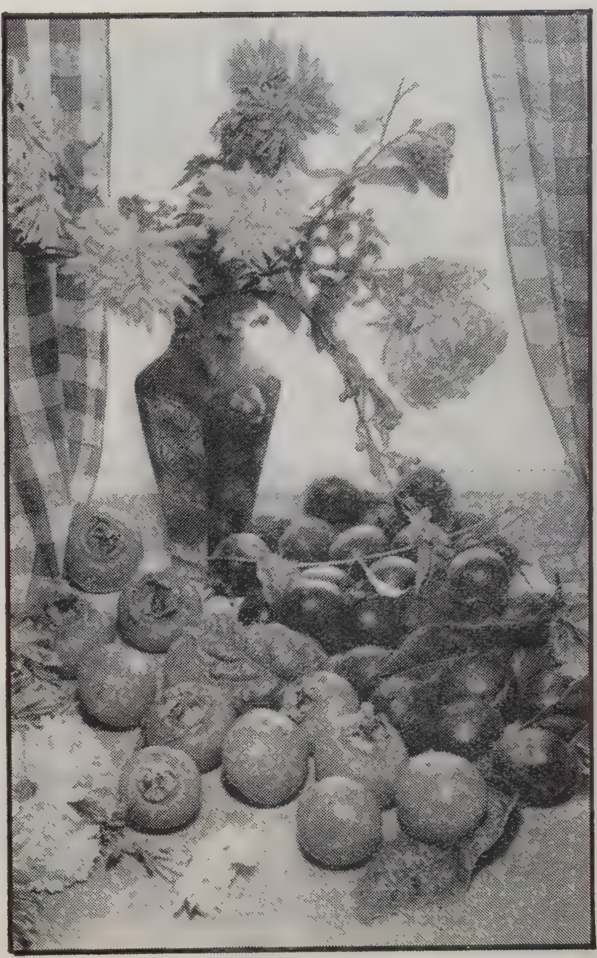
Mix the flour to a smooth paste with a little of the water. Soak the gelatine in the rest of the water for 5 minutes. Add the flour paste and the sugar to the gelatine mixture and stir them thoroughly. Heat and boil the mixture for 3 minutes. Cool it and when it begins to set beat it rapidly with an egg beater. When it is thick fold in the passion fruit pulp and lemon juice. Pour the flummery into a mould or serve it in individual dishes garnished with cream and crystallised cherries.

Passion Fruit Chiffon Pie

1½ cups of passion fruit pulp
¾ cup of sugar
1 tablespoon of gelatine
¼ cup of cold water
½ cup of boiling water
2 egg whites
Pinch of salt



Passion fruit icing



Add the sugar to the passion fruit pulp and mix both thoroughly. Soften the gelatine in the cold water, add the boiling water, and stir the mixture well. Mix it with the pulp and allow it to thicken. Beat the egg whites and salt until the whites are stiff and fold them into the fruit mixture. Pile the chiffon into a previously baked short-pastry shell.

Passion Fruit Cream Filling

Sieve 1 cup of passion fruit pulp to remove the seeds and fold 1 cup of whipped cream into the pulp. Use the filling for sponge sandwiches.

Passion Fruit Filling

2 tablespoons of butter
1 tablespoon of boiling water
2 tablespoons of icing sugar
1 tablespoon of passion fruit pulp

Cream the butter and add the sugar and beat it in. Add the boiling water and beat the mixture till it is fluffy. Add the passion fruit pulp last. Use the filling for sponge cakes, sponge drops, and pastry tartlets.

Passion Fruit Icing

Pulp of 4 passion fruit
Boiling water
1 cup of icing sugar

Mix the icing sugar and water to a spreading consistency. Add the passion fruit pulp and mix it in thoroughly. The icing should now be thin enough to pour smoothly on to the cake and cover the sides.

Passion Fruit Butter

1oz. of butter
2 eggs
4oz. of sugar
Pulp of 3 passion fruit

Beat the eggs and sugar till they are thick and add the passion fruit pulp and the butter. Cook the mixture in a double boiler over hot water, stirring it constantly until it

SPEEDWAY
STERILISER
BURNS OIL OR WOOD
STEAM & BOILING WATER
SS-1-2

Write for free illustrated catalogue to Speedway Products Ltd., 26 Albert St., Auckland. South Island Distributor: A. H. Turnbull & Co. Ltd., Christchurch.

THE MIGHTY ATOM

This amazing little "O" Gauge Locomotive, only 12½in. long, is so powerful it will haul 3 carriages for 15 minutes **on one fill.** With Brass boiler, safety valve and ¾ x ¼ cylinder driving wheels through gearing. Strong, durable, simple and reliable. Enamelled in green with red, black and brass trimmings, price as illustrated, **75/-** post free.

Send stamped addressed envelope for list of other models.

MOVIE MODELS

Engineers and Model Makers,
HAVELOCK NORTH, HAWKES BAY.

CORRUGATED
IRON

CORRUGATED BLACK IRON

Reasonably heavy (22 gauge), easy to work, and if well painted should last indefinitely.

The Ideal Roofing for
FARM BUILDINGS
GARAGES
BACHES, ETC.

Superior Sheets. 5ft. x 2ft. 4in., 11/- and 6ft. x 2ft. 6in. 14/- per sheet on rail.

AVAILABLE NOW FOR IMMEDIATE DELIVERY

MAX TOOLEY

Box 2621, Auckland. Phone 68-000, Ext. 2334

A GIFT SUBSCRIPTION

If you wish to make a gift of a "Journal" subscription to a friend, please forward the name and address together with your remittance of 10s. to the Publications Section, Department of Agriculture, Auckland, Wellington, Christchurch or Dunedin. Your friend will then be advised who is the donor of the gift.

...worth keeping your eye on
3170
3188
Academy
PATTERNS

Keep your eye on the Academy Catalogue for the latest style news in home dressmaking.

A·13

OBTAINABLE FROM LEADING STORES THROUGHOUT NEW ZEALAND

the pattern that's fashioned to fit

STARRED for distinctive service

STYLED FOR
MEN WHO KNOW QUALITY

Friendly Fit
FINE SHOES FOR MEN

SEAL OF QUALITY SARGOODS

Distributed throughout N.Z. by Sargood Son and Ewen Ltd.

thickens. Pour it into sterilised jars and allow it to cool slightly. Pour melted wax over the surface of the butter and cover the jars. The butter will keep for some months and makes an excellent sandwich spread.

Passion Fruit Jam

Passion fruit and sugar are the only ingredients for this jam. Cut the passion fruit in halves and scoop out the pulp. Boil a quarter of the skins until they are tender and remove the soft pulp from the skins and add it to the seeds and juice. Weigh the pulp and measure out ¾lb. of sugar for each pound of pulp. Put the sugar to warm in the oven. Boil the pulp hard for 10 minutes. Add the warmed sugar. Bring the mixture back to the boil and boil it hard, stirring constantly. As soon as the jam no longer pours from the spoon in a thin stream remove it from the heat and test it for setting by putting a spoonful on a saucer and leaving it for a minute or two. If the jam wrinkles when the saucer is tilted, it is ready to set. If not, boil it more gently until it is correct in the test. Pour the jam into sterilised jars and cover the jars.

Tomato and Passion Fruit Jam

2lb. of ripe tomatoes
6 passion fruit
3lb. of sugar
1lb. of peeled and cored apples

Skin the tomatoes. Slice the tomatoes and the apples and boil them together until they are soft. Add the warmed sugar and stir the mixture until the sugar dissolves. Boil it hard for half an hour; add the passion fruit pulp and boil the mixture for 5 minutes. Test it for setting. If necessary, continue to boil it until setting point is reached. Pot and seal it in the usual way.

Persimmon pie with whipped cream.

Piemelon and Passion Fruit Jam

2lb. of diced piemelon
2lb. of sugar
1 lemon
½lb. of passion fruit pulp

Cover the melon with the sugar and stand it overnight. Slice the lemon thinly, remove the pips, and add the lemon to the melon and sugar. Bring the ingredients carefully to the boil to prevent sticking, and boil them hard for 20 minutes. Add the passion fruit pulp and boil the jam until it reaches setting point. Pot and seal it in the usual way.

Peach and Passion Fruit Jam

3lb. of slightly under-ripe peaches
1 dozen passion fruit
3lb. of sugar

Peel and stone the peaches. Scoop the pulp from the passion fruit. Boil the passion fruit skins with a pint of water until they are tender, then strain them. Add the strained liquid to the peaches and boil it until the peaches soften. Add the sugar and passion fruit pulp and stir the mixture until the sugar dissolves. Boil the jam hard until it reaches setting point. Pot and seal it in the usual way.

Preserved Passion Fruit Pulp

Make a syrup in the proportions of 1 cup of sugar to 1 cup of water. Measure the syrup and add an equal quantity of passion fruit pulp. Boil the mixture for 10 minutes. Bottle and seal it. The pulp may be used as a topping for ice cream.

Passion Fruit Cordial

Pulp of 8 passion fruit
2 cups of sugar
2 teaspoons of citric acid
1 pint of water

Add the citric acid to the passion fruit pulp and stir the mixture thoroughly. Make a syrup of the sugar and water and add the passion fruit mixture. Bring the mixture back to the boil for 1 minute. Allow it to cool slightly, strain it into sterilised bottles, and seal it.

Passion Fruit Sauce

1 cup of passion fruit pulp
1 dessertspoon of cornflour
1 cup of water
1 dessertspoon of sugar

Preserved passion fruit pulp on ice cream.

Baked persimmon pudding.

Mix the cornflour and sugar to a thin paste with a little of the water. Heat the remainder of the water and add it to the paste. Return the paste mixture to the saucepan and boil it for 5 minutes. Stir in the passion fruit pulp and serve the sauce with steamed or baked puddings.

Persimmons

The taste for persimmons is possibly acquired and many people are prejudiced against them because the raw fruit has to be soft-ripe before it loses its astringency. Persimmons can be cooked and made into jam or jelly. Combined with other flavourings, persimmon pulp can be used in a variety of puddings. Dried persimmons are considered a great delicacy in Japan; although the method of drying is a fairly long process, a description of it is given here.

Drying Method

The method of drying persimmons described here is a Japanese one. The persimmons are harvested when they are yellow-brown. The fruit stem and half an inch of the branch on both sides of the stem should be picked with the fruit. The fruit should be peeled within 48 hours of being picked. If left any longer, it may become flabby and useless for drying.

Peeling of the fruit should start at the calyx end, a small piece of skin being left at the stalk end of the persimmon to prevent it dropping off when it is being dried.

The piece of branch adhering to the stem is then poked through a rope as shown in the illustration at right. About 20 fruits are hung on one piece of rope, which is hung up by both ends to form a loop. They are hung in the open, but must be sheltered from rain to prevent green mould and souring.

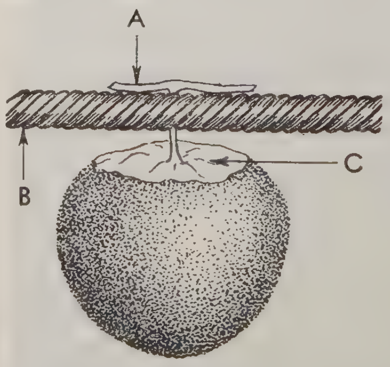
Once the "raisin" stage is reached, the dried persimmon is cut on one side, the seeds are removed, and the fruit is closed up again.

The persimmons are then preserved by spreading them in single layers in a box lined with straw, with about ½in. of straw between each layer. The top layer is covered with 1in. of straw. The lid should contain a few small ventilation holes. Several weeks later white powdery crystals of glucose will appear on the fruit, and are proof that the curing process has been satisfactory.

Persimmon Recipes

Dessert Persimmons

Use only soft-ripe fruits and chill them in a refrigerator. Using a serrated-edged knife cut the skin from top to bottom several times. Peel the skin back in the form of petals. Squeeze lemon juice over the fruits and garnish them with chopped nuts. Persimmons can also be cut in segments and used in fruit salads.



Method of hanging persimmons for drying: A—Piece of branch pushed through rope (B). C—Unpeeled section of the fruit left near the stem to prevent the fruit from falling.

Persimmon Pie (1)

Pastry shell
1 cup of persimmon pulp
Walnut halves
1 cup of sweetened whipped cream
1 dessertspoon of lemon juice

Stir the lemon juice into the persimmon pulp. Fold in the whipped cream. Pile the filling in the pie shell and decorate it with the halved walnuts.

Persimmon Pie (2)

Lightly cooked pie shell
1½ cups of persimmon pulp
1 cup of sugar
1 tablespoon of golden syrup or treacle
Pinch of ground cloves
1 teaspoon of cinnamon
Pinch of salt
2 eggs beaten in 1 cup of milk

Melt the syrup and stir it into the persimmon pulp. Add the dry ingredients and lastly fold in the egg and milk mixture. Pour the mixture into the pie shell and cook the pie at 400 degrees F. until the filling sets.

Persimmon Pudding

1 egg
½ cup of sugar
1 cup of flour
1 teaspoon of baking powder
¼ teaspoon of salt
¾ cup of milk
3 tablespoons of butter
Lemon essence
1 cup of persimmon pulp

Beat the egg and add the sugar. Beat them till they are light and frothy. Add the dry ingredients and then the milk with the butter melted in. Lastly fold in the persimmon pulp. Turn the mixture into a greased baking dish. Bake it for half an hour in an oven at 350 degrees F.

Persimmon Cream

2 cups of persimmon pulp
2 cups of thick custard sauce
¼ cup of chopped nuts
¼ cup of chopped cherries

Make the custard sauce in the usual way, using 2 eggs and 1 tablespoon of cornflour for 2 cups of milk. Blend the custard and persimmon pulp. Fold in the nuts and fruit. Serve the mixture in individual dishes with a thin slice of lemon, or turn it into a freezing tray and freeze it for half an hour.

Persimmon Jam

2lb. of persimmon pulp
1lb. of rhubarb
3lb. of sugar

Chop the rhubarb into short lengths and cook it gently with ½ cup of water until it is tender. Add the persimmon pulp and the heated sugar and boil the jam until it reacts correctly in the setting test. Pot and seal it.

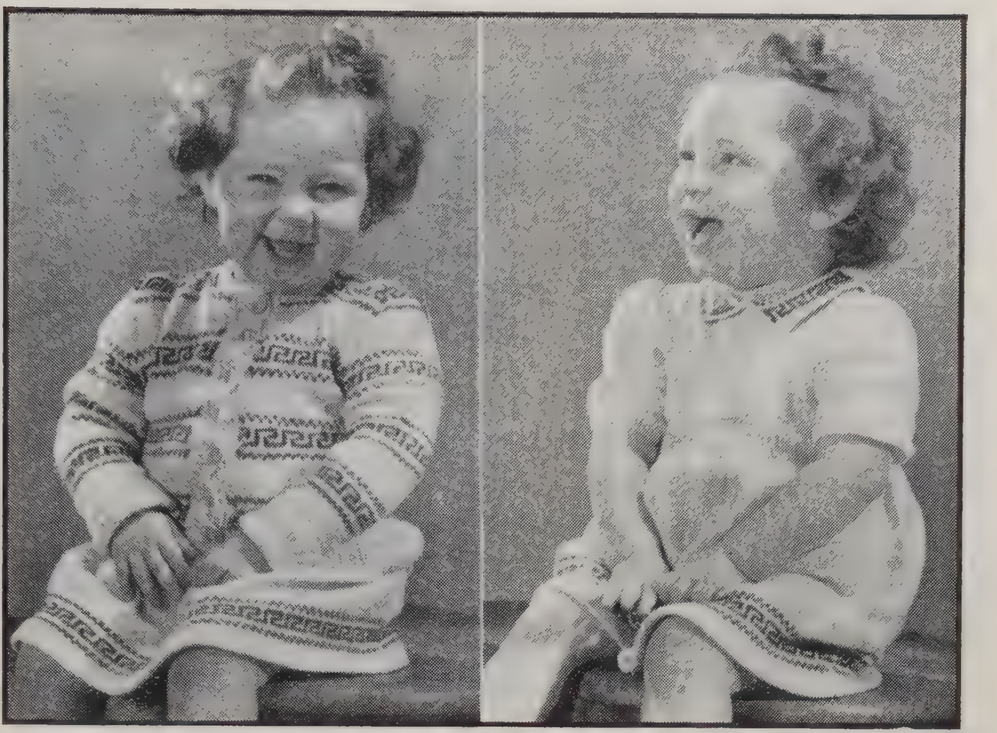
Persimmon Jelly

3lb. of persimmons (slightly under-ripe for preference)
3 lemons
Sugar

Remove the blossom ends from the persimmons and slice the persimmons and lemons. Place both in a basin and cover them with water; soak them overnight. Boil them until the lemon is soft. Strain the mixture through a jelly bag. Measure the juice and add ¾ cup of sugar for each cup of juice. Boil the mixture hard for 5 to 10 minutes or until it "sheets off" the spoon. Pour the jelly into hot, sterilised jars. Allow it to cool slightly and seal it with melted paraffin wax. Cover the jars and tie down the covers.

All photographs by Sparrow Industrial Pictures Ltd.

Two-piece Suit for Baby Girl



GREEK KEY pattern is used on the attractive and serviceable two-piece suit illustrated. The frock and coat are for a girl of 18 months to 2 years.

THE abbreviations used are: K., knit; p., purl; st.st., stocking stitch; l., light; d., dark; tog., together; beg., beginning; inc., increase; rep., repeat; st. stitch(es); rem., remaining. Tension is 7½ stitches in width and 10 rows in depth to 1in.

The Frock

Materials: 3½oz. of pure Botany fingering 3-ply wool in light green and a small quantity of contrasting darker green wool, a pair each of No. 10 and 12 knitting needles, a crochet hook, and 5 small buttons.

Measurements: Length from shoulder to lower edge, 18in.; width all round under arms, 22in.; sleeve seam, 2½in.

The Front

Using No. 10 knitting needles and l. wool, cast on 138 st. and work in st.st. for 1½in. Change to Greek key pattern. First row: (k. 1, l., k. 1. d.), rep. to end of row. Second row: (p. 1, l., p. 1, d.), rep. to end of row. Third row: K. with l. wool. Fourth row: P. with l. wool. Fifth row: (k. 1, l., k. 5, d.). Rep. to end of row. Sixth row: (p. 1, d., p. 3, l., p. 1, d., p. 1, l.), rep. to end of row. Seventh row: (k. 1, l., k. 1, d., k. 1, l., k. 3, d.), rep. to end of row. Eighth row: P. 2, l. (p. 1, d., p. 1, l., p. 1, d., p. 3, l.). rep. to last 4 st., p. 1, d., p. 1. l., p. 1. d., p. 1. l. Ninth row: K. 2, d. (k. 1, l., k. 5. d.), rep. to last 4 st., k. 1, l., k. 3, d. Tenth row: P. with l. wool. Eleventh row: K. with l. wool. Twelfth row: (p. 1, l., p. 1, d.), rep. to end of row. Thirteenth row: (k. 1, l., k. 1, d.), rep. to end of row.

Now change to st.st., using l. wool only until work measures 11in. from beg. Change to No. 12 needles. Next row: K. 15, (k. 2 tog.) to end, finishing k. 15 (84 st.). Work on these st. in k. 1, p. 1 rib for 11 rows.

Change back to No. 10 needles and work in st.st. for 16 rows. Shape the armholes by casting off 4 st. at the beg. of the next 2 rows, then 2 st. at the beg. of the next 2 rows, then dec. 1 st. at the beg. of each row until 70 st. rem. Work on these 70 st. for another 3½in.

Shape the neck. Work on the first 35 st. Turn, leaving rem. st. on a spare needle. Next row: Cast off 5 st. (neck edge) at beg. of next 2 alternate rows, then dec. 1 st. at neck edge in every row until 20 st. rem. Work 3 more rows. Shape the shoulder by casting off 10 st. at beg. of next 2 alternate rows at the armhole edge. Go back to st. left on stitch holder and work up this side to match.

The Back

Work as for the front until the waistband has been finished. Change to No. 10 needles and divide for the neck opening. Work on the first 42 st. for 16 rows (leaving other st. on a spare needle). Shape the armholes. Cast off 4 st. at the beg. of the next row, then 2 st. in the alternate row; then dec. 1 st. at the same edge. Work on the rem. 35 st. for 4in., finishing at the armhole edge. Shape the shoulders by casting off 11 st. at the beg. of the next row and the alternate row. Cast off the rem. 13 st. for the back of the neck.

Cast on 5 st. and join to 42 st. on a spare needle. K. to end of row. Next row: P. to the last 5 st., rib 5. Work to correspond with the right back, keeping 5 ribbed st. for the buttonhole border correct. Cast off 18 st. for the back of the neck.

The Sleeves

Using No. 10 needles and l. wool, cast on 50 st. and work 7 rows in a k. 1, p. 1 rib. Eighth row: Rib 3, inc. 1 st. in next st. Rep. to last 2 st., rib 2 (62). Work 20 rows in st.st. Shape the top by casting off 4 st. at the beg. of the next 2 rows, then dec. 1 st. at both ends of every row until 40 st. rem. Work on these 40 st. for 4in. from the armhole shaping. Cast off and gather the top of the sleeve.

The Collar

Using No. 10 needles and l. wool, cast on 36 st. and work 2 rows in rib. Change to Greek key pattern, finishing with 2 ribbed rows in l. Cast off ribwise. Make the other half of the collar in the same way.

To Make Up

Press the work on the wrong side with a warm iron and damp cloth. Sew the shoulder seams together. Sew in the sleeves, then sew up sleeve and side seams. Make a row of double crochet along the small sides of the collar. Sew on the collar. Make 5 loops along the right side of the back opening and sew on 5 buttons to correspond. Turn up the lower edge of the frock for ¾in. and slip stitch it lightly on the wrong side. Press all seams.

The Coat

Materials: 2½oz. of pure Botany fingering wool in light green and 1oz. in darker colour, 1 pair each of No. 10 and 12 knitting needles, 8 buttons.

Measurements: Length from shoulder to lower edge, 11in.; width all round under arms, 22in.; length of sleeve seam, 10in. (including turn-back cuff).

The Back

Using No. 12 needles and l. wool cast on 78 st. and rib for 22 rows. Change to No. 10 needles and work 13 rows of Greek key pattern as for the frock. Break off the wool and work 13 rows in st.st., using l. wool only, starting and ending with a p. row. These 26 rows form the pattern.

246—BABY'S TWO-PIECE SUIT . . .

Rep. the last 26 rows once. Shape the armholes. Cast off 4 st. at the beg. of the next 2 rows, still working in pattern, then cast off 2 st. at the beg. of the next 2 rows. Cont. without dec. and after the fourth Greek key pattern work 1 back row. Next row: Shape the shoulders. Cast off 11 st. at the beg. of the next 4 rows, and cast off the rem. 22 st. for the back of the neck.

The Right Front

Using No. 12 needles and l. wool, cast on 49 st. and work 6 rows in rib. Seventh row: Rib 3, cast off 2 st. for the buttonhole, rib to the end. In the next row cast on 2 st. in place of those cast off. Rib 12 rows. Twenty-first and twenty-second rows: As for the seventh and eighth rows. Next row: Change to No. 10 needles, rib 7, and put them on to a safety pin. Work in Greek key pattern on the rem. 42 st. After the second light stripe work 1 front row. Shape the armhole. Cast off 4 st. at the beg. of the row and then 2 st. at the beg. of the alternate row. Work on the rem. 36 st. until the third light stripe has been finished, work 2 more rows.

Shape the neck by casting off 4 st. at the beg. of the row, then 2 st. at the beg. of the alternate row. Work on the rem. 30 st. until the Greek key pattern has been finished. Then shape the shoulders by casting off 15 st. at the beg. of the next 2 alternate rows.

The Left Front

Work the left front as for the right front, but omit buttonholes and reverse all shapings.

The buttonhole strip: Using No. 10 needles, rejoin wool to 7 st. on a safety pin and work 6 more buttonholes in every thirteenth and fourteenth row, ribbing throughout. After the eighth buttonhole work 1 more row and leave it on a spare needle again. Make the left buttonhole border, omitting buttonholes and finishing with a front row.

The neck border: Sew the shoulder seams together; then, with right side of work facing, slip the first 7 st. from the buttonhole border on to a knitting needle and pick up 15 st. along the front neck, 19 st. along the back and 15 st. along the second front part, and 7 st. from the border (63 st.). Rib for 5 rows and cast off ribwise.

The Sleeves

Using No. 12 needles and l. wool, cast on 48 st. and rib for 22 rows. Change to No. 10 needles and pattern; inc. 1 st. at both ends of the next and every fourth row following until there are 60 st. on the needle. After the third light stripe, shape the top by casting off 4 st. at the beg. of the next 2 rows, then dec. 1 st. at both ends of every front row, still keeping to pattern, until 14 st. rem. Cast off.

To Make Up

Press the pieces with a warm iron and damp cloth. Sew in the sleeves and then sew up sleeve and side seams. Sew front borders in position. Sew on buttons to correspond with buttonholes.

Dishes which Can be Reheated

RECIPES for dishes which can be prepared in advance and reheated or which are appetising either hot or cold are most useful for the housewife. If she has to be away from home during the day, the family can have good meals during her absence; when the men are working on an urgent job and meal times are uncertain there will be something ready for them whenever they come in.

THE type of all-in-one dish which combines meat or fish with vegetables is specially suitable for this purpose.

Fish Bakewell (Illustrated)

6 fillets of white fish
1lb. of boiled potatoes
½ pint of milk
1oz. of dripping
1 tablespoon of flour
1 onion
1 dessertspoon of chopped parsley
Salt and pepper
2 or 3 tomatoes (optional)

Stuffing: 1 breakfastcup of breadcrumbs, 1 teaspoon of mixed sweet herbs, 1 teaspoon of thyme, 1 beaten egg, juice of ½ lemon, parsley.

Clean and flour the fillets and season them with salt and pepper. Mix the breadcrumbs with the herbs, seasoning, and lemon juice and add just enough beaten egg to make a stiff mixture. Put a spoonful of stuffing in the centre of each fillet, roll the fish around it, and secure each roll with a sharpened matchstick or a piece of cotton.

Cook the onion with the potatoes, remove it with ½ pint of the potato liquor, chop it up, and return it to the liquor with the milk. Melt the dripping in a saucepan and stir in the flour and a good sprinkle of salt and pepper. Cook these for a minute or two before gradually adding the milk and water and chopped onion. Continue to cook and stir the mixture until it becomes a smooth white sauce. Stir in the parsley.

Put a bed of mashed potato into a deep baking dish, leaving spaces at intervals for a fillet. Stick the fillets in place, cover them with the sauce, and put the cut up tomatoes at intervals between the fish. Bake the dish for about 30 minutes in a moderate oven. Garnish it with parsley.

This dish reheats admirably—a little extra sauce poured over it before it is reheated will keep it moist and delicious.

Soused Herrings

6 large herrings
1 pint of vinegar
3 bay leaves
6 peppercorns
Salt and pepper

Split the herrings down one side and dust inside the fish with salt and pepper. Put the vinegar in a saucepan with the bay leaves and peppercorns, bring it to the boil, and allow it to simmer for about 10 minutes.

Arrange the fish in a pie dish or casserole and pour over it the flavoured vinegar. Bake it for 30 minutes in a moderate oven. Serve the meal hot or cold.

Meat Loaf

1½lb. of sausagemeat
2 breakfastcups of fresh breadcrumbs
1 egg
Juice of ½ lemon
Pinch of sweet herbs
Sage
Browned breadcrumbs
1 dessertspoon of chopped parsley

Mix together all but the browned breadcrumbs, blending the ingredients really well. Pack the mixture into a greased loaf tin and bake it in a moderate oven for 45 minutes. Turn the loaf out and coat it with browned breadcrumbs. Serve the loaf hot with vegetables and gravy or cold with salad.

Making the Best Use of the Household Water Supply

By EVELYN E. MOORE, Rural Sociologist, Department of Agriculture, Palmerston North

TREATMENT of hard water was described in the first part of this article on making the best use of household water supplies, which appeared in last month's "Journal". This concluding portion deals with the treatment of other sources of trouble in spring and well water—corrosive and rust-producing defects—and with household laundry materials.

OFTEN after a water supply has been connected and been in use for a period trouble is experienced with rust stains on enamel or porcelain baths, basins, and sinks and on household linen and clothing and with a brownish deposit in kettles and boilers. In some cases the water also has an objectionable flavour, especially when used for making tea. Sometimes the water may be clear and sparkling when freshly obtained, but, if left standing for two or three hours, it will become cloudy, a fine whitish or pale brown sediment finally settling on the bottom of the container. This is one easy test for the presence of iron in water. Corrosive waters do not always contain iron, however, so that it is advisable, if such properties are suspected, to have the water checked by an analyst.

Presence of Carbon Dioxide

These stains and brown deposits are caused by the presence in the water of dissolved carbon dioxide, a gas with which most people are familiar, as it is responsible for the "gasiness" of aerated beverages and beer. It is produced also by the decay of vegetable material in swamps and underground peaty areas; underground streams dissolve the gas, the amount present varying according to the source of supply. Water containing dissolved carbon dioxide is slightly acid and like other acid solutions can attack or corrode various materials. Consequently if in its passage underground it passes through limestone, some limestone is dissolved, the salts causing the temporary hardness discussed in the previous article being produced. If on the other hand it passes through iron-bearing materials, some of the iron is dissolved. Such water will also attack concrete or iron tanks and iron pipes, boilers, and other equipment used in transport and storage and cause considerable consequent trouble in its use in the home, even though the water is iron free at its source. In addition under most circumstances it corrodes pipes; rust is deposited and an internal scale is built up, so that the pipes gradually become blocked, the flow of water and pressure being correspondingly impaired. Copper piping is also attacked, with subsequent blue or green staining of laundry and baths. When this water has been stored in concrete tanks, the minerals dissolved will be deposited later as a hard scale in kettles, boilers, and on heating elements.

Water containing carbon dioxide is also troublesome in laundering, as the addition of soap or soda facilitates the formation of rust stains on clothing, with, of course, the consequent waste of cleaning materials; nor can iron-containing water be used with a zeolite water-softening plant, as the iron permanently neutralises the zeolite.

Treatment of Acid-containing Water

Treatment of acid-containing water, whether or not it also contains iron at its source, is the same, as the removal of the trouble-causing carbon dioxide also results in the removal of the dissolved iron bicarbonate. It consists first in the removal of as much dissolved carbon dioxide as possible by aeration. Various methods such as spraying the water through fine nozzles under pressure (the most satisfactory method) or by passing it down a chute with baffles are used. The remainder of the carbon dioxide is then removed by treatment with limestone, usually by passing the water through a filter bed of crushed limestone about 3ft. thick. If the water contains iron, the treatment will also remove it, but rust will accumulate on the limestone, so that it is necessary to back flush the filter occasionally to wash the iron rust off the limestone.

It is possible to obtain advice on the installation of water-treating equipment from the manufacturers of water-softening equipment and others. An analysis of the water to enable efficient and satisfactory treatment is essential, as is the case with hard water, and instructions on the use of the filter should be carried out carefully, if an acid- and iron-free supply is required.

Treatment of Rust Stains

Treatment of rust stains is not often attempted in the home—they tend to be regarded as inevitable and irremovable, yet they can be removed satisfactorily, if they are not severe and long-standing.

Rust stains on sinks, basins, or baths usually will disappear if rubbed with a piece of lemon and then cleaned in the ordinary manner. The treatment should be repeated if necessary. If this fails to remove the stain, a 5 per cent. solution of oxalic acid (this can be obtained from a chemist, but as it is poisonous, it should be used carefully) can be applied to the stain and left on for a few moments or until the stain disappears. It should be thoroughly washed off, as it will damage the surface of the enamel if left on for too long. Very severe staining, however, may not be removed even by oxalic acid.

The removal of rust stains from clothing and household linen was discussed in an article in the February 1950 issue of the "Journal". Briefly, the advice given was that lemon juice, or salt followed by lemon juice, and oxalic acid are useful in the removal of iron stains from fabrics. They are used most effectively by moistening the stained area with lemon juice, or if it fails, oxalic acid, and stretching the stained part over a bowl or kettle of boiling water. Oxalic acid should be washed out very thoroughly, the addition of a few drops of ammonia to the rinsing water being desirable.

Oxalic acid should not be used to remove rust stains from woollen materials, and it should be tried on an inconspicuous part of the article before being used on coloured fabrics, as the colour may be removed or altered.

HOUSEHOLD LAUNDRY MATERIALS

There are many laundry soaps, washing powders, soap powders, bleaches, and other laundry aids advertised today, all apparently indispensable to good washing, so that the economical housewife may well wonder which is the best to use for efficient cleaning, while ensuring that at the same time there will be no unnecessary wear and tear on clothing or household linen.

There are, for example, some cleaning materials which, if carelessly or inappropriately used, can halve the life of fabrics or cause rapid fading, shrinkage, or yellowing of white fabrics. The suitability of various types of cleaning material for different work varies considerably.

Soap and Soap Substitutes

Soaps and soap substitutes to wash efficiently should wet the fabric thoroughly and quickly so that the dirt is easily and speedily removed; should be able to suspend the dirt in the washing water so that it does not resettle on the clothing or linen being

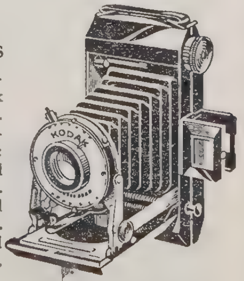
Woollen sock shrunk by careless washing compared with a sock of the same type before it was washed.

KODAK

Cameras

make every outing complete

620 FOLDING KODAK CAMERAS



Model A. 8 pictures size 2¼in. x 3¼in. on 620 film. Synchro-flash contacts. 3 models: f6.3 lens, 2 speed shutter, **£12/13/3.** f4.5 lens, 4 speed shutter, **£19/12/9.** f4.5 lens, 8 speed shutter, **£23/3/-.**

620 BROWNIE CAMERAS

8 pictures size 2¼in. x 3¼in. on 620 film. Model C (illustrated) single speed shutter, time exposure, **£2/4/8.** Model D with built-in portrait lens, **£2/12/10.** Model E with built-in portrait lens, colour filter, synchro-flash contacts, **£3/3/-.**

* Free! Illustrated booklet. Obtain your copy now from all Chemists, Kodak dealers and

KODAK N.Z. **LTD.**

292 Lambton Quay, Wellington. 162 Queen Street and 14 Fort Street, Auckland. 681 Colombo Street, Christchurch. 162 Princes Street, Dunedin.

The Union Line Travel Service

for All your Travel

BY SEA. Within New Zealand or to Australia, Indonesia, India, Ceylon, Mediterranean Ports, United Kingdom, Europe, Pacific Islands and North America.

BY AIR. As agents for all principal Air Lines, the Union Company can book you by air services within New Zealand and to anywhere in the world.

BY LAND. Within New Zealand, Australia and North America by rail or road services. Also in conjunction with sea or air travel.

CONSULT AND BOOK WITH

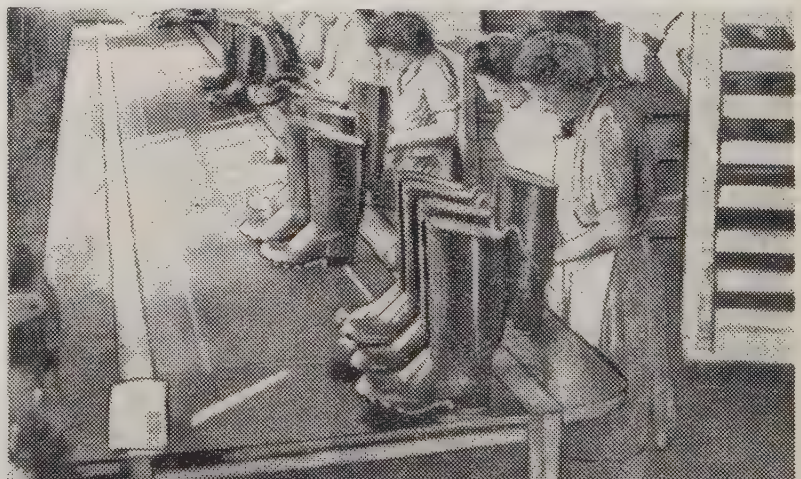
UNION STEAM SHIP CO. OF N.Z. LTD.

BRANCHES THROUGHOUT NEW ZEALAND

(Agents all principal Air Services)

15

In the modern factory in which MARATHON GUMBOOTS are made, skilled workers take a pride in producing Gumboots which give complete protection and satisfaction to the man on the land.



MARATHON

LOOK FOR THE MARATHON LABEL

Gumboots

washed; and should not in any way damage the fabrics they are used to wash. Though these requirements may seem self-evident, they show why soap alone, for example, is not as efficient for ordinary washing as soap and washing soda.

Soap, the most important and efficient all-purpose washing material yet discovered, is slightly inferior to washing soda and some other alkalis in its ability to penetrate and wet fabrics thoroughly. It is, however, the most efficient cleaning material for preventing the redeposition of dirt on the fabric. Two of the chief causes of "greyness" are simply the use of insufficient soap to keep the removed dirt suspended in water or leaving the boiled clothes soaking in the dirty water. Using too much soap, besides being wasteful, is inefficient, as extra rinsing is necessary and dirt is not removed as effectively as where the correct amount of soap is used.

It has been found that 1/6oz. of soap per gallon of softened water, or the amount which will maintain 1 to 2in. of lather, is the most efficient amount to use in removing dirt. Pure neutral soap (one type of neutral bar soap and neutral soap flakes are available in New Zealand) is harmless to all fabrics which will stand washing, though precautions must be taken when washing delicate materials, woollen materials, silks, and materials with colours which are not fast to ordinary washing. There are also the slight disadvantages that soap forms sticky, wasteful lime soaps with hard water (though this can be rectified by preliminary softening) and that it is unsatisfactory for washing in the presence of acid and salt, which are sometimes added to prevent dyes in some materials from running together. The acid in new silk or woollen materials will destroy soap, so that for satisfactory results such materials should be soaked previously in water containing a mild alkaline substance, such as borax, which prevents the soap from being destroyed but does not harm or cause yellowing of the fabrics.

Washing Woollens

Heat, rubbing, and drying in direct sunlight will cause shrinkage and yellowing of silk and wool as readily as will use of strong alkalis such as washing soda. One experienced writer on laundering has estimated that the life of the average washable woollen garment is approximately halved by inexpert washing. To prolong the life of woollen garments and blankets lukewarm water and a mild soap which has thoroughly dissolved in the water should be used, rubbing during washing should be avoided, and the articles should be dried out of direct sunlight, which turns many white woollens yellow.

In addition to soap many household bar soaps also contain rosin soaps and a small amount of washing soda. Rosin soaps dissolve more easily in water than soaps made from the fat or tallow often used for household soaps and they have good frothing power. Their washing power is inferior to ordinary soap, however, so that first-grade household soap by law can contain not more than 15 per cent. of rosin. This small amount of rosin, by increasing the rapidity with which the soap dissolves in water, is advantageous in dish washing or in ensuring the complete solubility of the soap and therefore washing efficiency in laundry work.

Soap Powders and Soap Flakes

Ease of solubility and convenience are the chief advantages of soap powders and soap flakes.

Though the amount of soap in first-grade soap is required to be at least 60 per cent. (measured as the fatty acid portion of the soap) soap powders have to conform to the standards of third-grade soap only (that is, 40 per cent. of fatty acid, of which two thirds may be rosin) and may contain unspecified amounts of washing soda, borax, and other substances. As household soaps may contain considerable amounts of water and as soap powders usually contain very little, the better-quality soap powders may be economical to use. They contain approximately equal parts of soap and washing soda or other alkali, which is the proportion giving the best washing conditions for fast-coloured cottons, linens, and rayons. Because of the wide variety in quality in bar soaps and soap powders and the wide range of costs of washing powders, the housewife will find it useful to compare the washing quality and the amount she has to use of each to maintain a satisfactory depth of lather.

Soap powders may also contain a bleaching substance, in which case they are labelled oxygen washers. Sodium perborate, a mild and reasonably safe bleach, is the one usually present, but with this or other bleaches certain precautions should be observed.

It is emphasised, however, that with proper washing methods no general bleaching should be necessary, as it is not a satisfactory substitute for the removal of soiling, and regular bleaching treatment can reduce considerably the life of household linen and clothing.

Bleaches are valuable for the removal of stains not easily removed by washing, such as tea stains or fruit stains, but are not recommended for the routine washing of sheets or pillowcases, for example, if maximum wear is desired.

Bleaches

Though several proprietary bleaches alone or combined with soap, or soapless detergents, are available, they are usually one of three types.

Hydrogen Peroxide and Sodium Perborate

There are hydrogen peroxide and sodium perborate (found in oxygen washers), which dissolves in water and has a bleaching action similar to hydrogen peroxide, some of which may be formed. They are safe mild bleaches for all types of fabric with fast colours, but may cause serious weakening of fabrics containing iron stains, which should therefore be removed by another method.

For the best results the soap powder should be dissolved in warm (not hot) water and added to the tub or washing machine and contents which also should be only warm. Gradual heating releases the oxygen slowly from the hydrogen peroxide which has been formed, allowing time for slow and even bleaching. If the soap powder is added to boiling water, there is an extremely rapid and probably ineffectual release of oxygen.

Liquid Chlorine

Secondly, there are liquid chlorine bleaches, which are stronger than the type already described, and are likely to cause severe damage to fabrics if not correctly used. They cause serious yellowing of silk and wool and rapid rotting of crease-resistant rayon. If bleaching of these materials is necessary, one of the other types of bleaches should be used.

Liquid chlorine bleaches should be used in concentrations not greater than those recommended by the manufacturer, as though there may be faster bleaching, there may also be rapid deterioration of the fabric. They should never be used in water hotter than 140 degrees F., the treatment should be carried out (on stained tablecloths, for example) before washing, and the bleach should be rinsed out before regular washing is begun. Overnight or long soaking in water containing a bleach is also inadvisable.

Dye-stripping Bleaches

Lastly there are the dye-stripping bleaches, which, because of their cost, are not used in normal washing.

Fluorescent Dyes

Some varieties of soap powder now on the market contain the new fluorescent dyes. These are white powders which act like dyes and which fluoresce; that is, they give off bluish-white light of their own in daylight. The colourless dyes cling to fabrics, brightening them even when they are coloured because of their soft radiance, and making white materials seem whiter, because the slight bluish white light counteracts the yellowing effect of washing soda. Unlike bleaching substances fluorescent dyes have no damaging effect on fabrics.

Alkalis

Alkalis such as washing soda are incorporated in soap powders because they improve the dirt-removing properties of soap. Used alone, however, they are quite unsatisfactory, as they do not have the dirt-suspending powers of soap, so that much of the soiling may be redeposited on the surface of the clothes, leaving them a uniform grey colour.

Washing soda, which is also a water softener, is the cheapest and the most suitable alkali to use with soap in washing white and fast-coloured cottons and linens, but it causes yellowing of woollens and silks; even with cotton and linen goods excessive amounts of soda should not be added. Excessive quantities decrease the dirt-suspending property of soap and reduce considerably the wearing quality of fabrics.

A number of alkalis are used instead of washing soda or in conjunction with it for washing. Some of them have special uses in industry and commercial laundries, but as they are invariably more expensive than washing soda, their use in households is seldom justified. Of those included in the various soap powders borax is probably the most valuable, as it is a very mild alkali and may be used safely for washing woollens, silks, and coloured fabrics. A soaking in a weak borax solution preliminary to washing neutralises the acid in new woollen and silk materials without in any way harming them and prevents the acid from destroying the soap and perhaps leaving greasy stains on the materials. It also helps to increase the stiffness of starched fabrics and to prevent the limpness which occurs on damp, humid days.

Borax is an expensive and unsatisfactory substitute for washing soda for washing cotton or linen goods, nor has it, as is sometimes supposed, any bleaching action.

Modified soda, consisting of equal amounts of washing soda and baking soda, is also a weak alkali and is therefore valuable for washing silks and woollens. It is included in some all-purpose soap powders, as it is satisfactory for all types of washing, because boiling changes it into washing soda.

There is also a sodium hexametaphosphate preparation which is an excellent all-purpose water softener and washing powder, but its scarcity —it is at present sold only by wholesalers to commercial users—precludes its use in the home. Commercial laundries sometimes use it, as it removes the greyness from household linen washed many times in hard water, but does not harm the fabric, as may occur when bleaches are used.

Ammonia, spirit soaps, petrol soaps, and cloudy ammonia (a mixture of ammonia and soap) and similar proprietary lines are, like bleaches, of value for removing stains, but are not used in the weekly wash, except perhaps to take out difficult stains.

Synthetic Detergents

Synthetic detergents are comparatively new. Their washing action is similar to that of soap in that they wet materials very well and therefore cause dirt to be removed easily. They also hold the removed dirt in the washing water. As they have a chemical structure different from that of soap, they can be used where soap is useless or is destroyed.

There are several synthetic detergents sold in New Zealand under various trade names, generally as soapless detergents, carpet shampoos, or soapless shampoos. Some are manufactured from breakdown products in the petroleum industry and are marketed by oil companies; others are made by chemical-manufacturing companies. Though the products are not yet well known throughout New Zealand, they are becoming more widely available and probably they will have a permanent place in many households eventually. They are more expensive to use than soap, but under certain conditions the added cost may be justified. Soap is cheaper and better for ordinary washing in soft water, but a little soapless detergent is sometimes used with soap, as together they speed up the removal of dirt.

Detergents may, if desired, replace soap for washing new or previously washed woollens and silks, as, unlike soap, detergents are not destroyed by the acid often present in new woollen or silk fabrics and, being neutral, they minimise the risk of shrinkage and of colours running. Provided plenty of water is used detergents may also be used to steep woollen garments before washing, thus reducing the amount of washing necessary. They can be used effectively in cool water in which they dissolve readily. Because detergents are not destroyed by acid (vinegar) or salt they can be used with these substances when washing garments with colours that run easily. As they do not produce any scum or deposit when used with hard water, they may be used safely instead of soap when it is inconvenient to soften the water first.

For dish washing where the water is hard, where very greasy dishes are to be washed, or when the hot-water supply has failed detergents are useful, as they give a cleaner wash and prevent grease from settling on the surface of the water or sides of the sink. They are also of value for cleaning windows, as carpet shampoos, or for sponging grease or soil marks on clothing, on which they are less likely to leave a discoloured or water mark than when other laundry materials are used.

Odd Nylon Stockings Can be Made Wearable Again

PROBABLY few wearers of nylon stockings have not at some time regretfully put aside an odd unblemished stocking because the other has been hopelessly torn or laddered. Yet two odd nylons may be restored to usefulness very simply by being boiled together in a large panful of water for 25 to 30 minutes, or until they become an even and uniform shade. It is important to have plenty of water so the stockings can be moved about in it freely and do not become streaked. To aid uniform redistribution of colour they should also be stirred from time to time with a smooth spoon or stick. The addition of a small amount of soap power seems to cause a quicker redistribution of colour.

Stockings of widely different shades may be boiled together, but unless dark- and light-coloured stockings are mixed, when an intermediate colour is obtained the resulting colour is lighter than the original colours and neutral in tone. After being rinsed and dried the stockings are ready to be worn. Their durability does not seem to be reduced and their appearance is satisfactory. Of course, only stockings with the same heel shaping and gauge may be treated or the difference is noticeable.

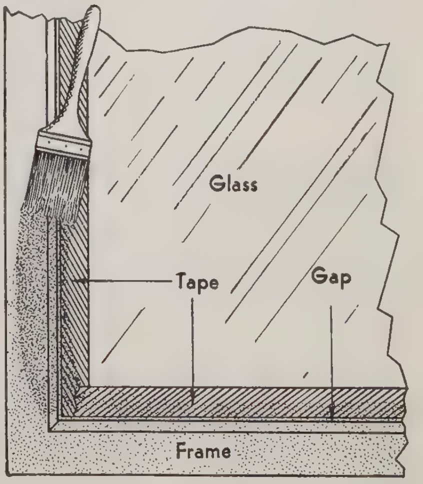
The laddered stockings can also be put to good use, as they are excellent to use for straining paint which has become lumpy.

—*EVELYN E. MOORE, Rural Sociologist,*
Department of Agriculture, Palmerston North

◆

Keeping the Glass Clean when Painting Window Frames

AN easy way of keeping paint off the glass when painting a window frame is to stick strips of adhesive tape (transparent cellulose tape is best, but is expensive) round the edges of the glass, leaving a fraction of an inch uncovered next to the frame. Then when the frame is painted a neat edge is ensured without all the care and time usually necessary to prevent an untidy outline, and because the paint is allowed to cover the edges of the glass a tight paint seal between glass and frame or putty is obtained to keep out moisture. Before the paint is dry the tape should be stripped off. The great advantage of using cellulose tape is that it strips off glass or any clean, smooth surface leaving practically no mark. Ordinary sticking plaster tends to leave behind some of the rubber adhesive, which must be cleaned off with methylated spirit or ether.



This method can also be used to protect door panels if the outer framing of the door is being painted another colour, or indeed for any painting in which two colours adjoin and a neat, straight outline is required between them. It is necessary to be sure that the tape will strip off the surface to be protected without marking it, but cellulose tape at least should strip quite cleanly off an enamelled surface.

—*EIRENE E. UNWIN,*
Rural Sociologist, Department of Agriculture, Christchurch

◆

"TOMATO COOKERY"

Families which appreciate tomatoes in their diet throughout the year will find useful the simple methods of preserving the fruit described in Department of Agriculture Bulletin No. 350, "Tomato Cookery".

As well as the section on preserving there are recipes and instructions for the making of pickles, chutneys, sauces, and jams. Attractive ways in which fresh tomatoes can be served in a variety of salads are also described.

◆

WHITE SAUCES

☆

THE perfect white sauce, which is smooth and creamy in texture and neither too thick nor too thin, has many uses in cooking. It may be made by one of the three methods given in this article by Nell Macpherson, Rural Sociologist, Department of Agriculture, Auckland.

☆

Roux Method

2 tablespoons of butter or fat
2 tablespoons of flour
¼ teaspoon of salt
1 cup of milk
Pepper to taste

Melt the butter in a small saucepan, add the flour mixed with seasonings, and stir them over gentle heat until they are well blended but not brown. Pour the milk in a little at a time and stir constantly to prevent lumps. When all the milk has been added bring the sauce to the boil and boil it for 2 minutes, still stirring constantly. To make the sauce more quickly ¾ cup of the milk may be heated before being added to the sauce.

Cold-mix Method

2 tablespoons of fat
2 tablespoons of flour
Pepper to taste
1 cup of milk
¼ teaspoon of salt

Mix the flour and seasonings to a smooth paste with a little of the milk in a saucepan. Add the remainder of the milk and beat the mixture with a rotary beater. Heat it to boiling point, stirring constantly to prevent lumps forming. Add the butter and boil the sauce for 2 minutes.

Hot-mix Method

2 tablespoons of butter
2 tablespoons of flour
Pepper to taste
1 cup of milk
¼ teaspoon of salt

This is the quickest method. Boil the butter, salt, pepper, and ¾ cup of milk in a saucepan. Mix the flour to a smooth paste with the remainder of the milk. Pour the boiling liquid into the paste, stirring to prevent lumps. Pour the sauce back into the saucepan and boil it for 2 minutes, stirring constantly.

Consistency

White sauces may be made in five thicknesses for use in different dishes. The proportions of fat and flour given below are for 1 cup of milk:—

Sauce	Fat	Flour	Use
Very thin ..	.. 1 tablespoon ..	½ tablespoon ..	Cream soups made from starchy foods
Thin ..	.. 1 tablespoon ..	1 tablespoon ..	Cream soups made from non-starchy foods
Medium	.. 2 tablespoons ..	2 tablespoons ..	Creamed dishes, scalloped dishes, sauces
Thick	.. 2 tablespoons ..	3 to 4 tablespoons	Souffles
Very thick	.. 2½ tablespoons ..	4 to 5 tablespoons	Croquettes

[*Sparrow Industrial Pictures Ltd. photo.*

Binding vegetable mixtures is one of the many uses to which white sauces may be put in cooking.

As a thickening agent ⅔ tablespoon of cornflour or 1½ tablespoons of wholemeal flour has the same effect as 1 tablespoon of flour. Water or stock may be used instead of milk, but a little more flour must be added.

Recipes Using White Sauces

Cream-of-pea Soup

Sieve 1 cup of cooked green peas. Heat 1 cup of very thin white sauce and add the green pea pulp and 1 teaspoon of chopped mint. Heat the soup to boiling point and serve it immediately.

Cream-of-tomato Soup

Sieve 1 cup of cooked tomatoes and heat the puree. Heat 2 cups of thin white sauce. Add the tomato puree slowly to the white sauce, stirring to prevent curdling. Serve the soup immediately, as it tends to curdle if allowed to stand.

Creamed Tongue

Mix 1 cup of chopped cooked sheep tongues, ½ cup of medium white sauce, and ½ tablespoon of cooked green peas in a saucepan and heat them to boiling point, stirring lightly to prevent burning. Serve the mixture on toast or fried bread.

Scalloped Lobster or Lobster au Gratin

4 cups of lobster cut into cubes
Buttered breadcrumbs
2 cups of medium white sauce

Grease a baking dish and fill it with alternate layers of lobster and white sauce, finishing with a layer of white sauce. Sprinkle the top thickly with buttered breadcrumbs. Bake the dish at 400 degrees F. until the sauce starts to bubble and the crumbs are browned. (Au gratin dishes are those covered with white sauce and sprinkled with breadcrumbs.)

Eggs au Fromage

6 hard-boiled eggs
3 tablespoons of grated cheese
1½ cups of medium white sauce
Buttered breadcrumbs

Shell and slice the eggs. Arrange the eggs and white sauce in layers in a greased baking dish, sprinkling each layer of eggs with the grated cheese. Finish with a layer of sauce and cover the top with buttered breadcrumbs. Bake the dish at 400 degrees F. until the breadcrumbs are browned. (Au fromage dishes are those to which cheese is added.)

Peach Souffle

2 cups of stewed peaches
¼ cup of sugar
¼ teaspoon of salt
1 cup of thick white sauce
4 eggs

Drain the peaches, cut them into fairly small pieces, and spread them on the bottom of a baking dish. Separate the eggs and beat the yolks with the sugar until they are thick and lemon coloured. Beat the whites and salt together until they are stiff.

Pour the boiling white sauce on to the egg yolks and cool the mixture. Fold in the egg whites and spoon the mixture over the peaches in the baking dish. Do not fill the dish more than two-thirds, as the souffle expands while cooking.

Set the dish in a pan of boiling water and bake the souffle for 30 to 40 minutes at 325 degrees F. Serve it as soon as possible after it is cooked or the mixture will fall. The juice from the peaches may be served with the souffle. These quantities make 6 servings.

Croquettes

Any mixture of vegetables, meat, or fish can be used. The usual proportions are 1 cup of very thick white sauce to 2 to 3 cups of the other ingredients. Mix them thoroughly and cool them. Shape the mixture into croquettes, roll them in egg and breadcrumbs, and fry them in deep fat.

◆

Herbaceous Perennials

THE herbaceous border, though it requires considerable care and attention, is when properly planned, planted, and maintained one of the most attractive garden features. In this month's article for the flower gardener, C. K. Ellis, Horticulturist, Department of Agriculture, Dunedin, discusses the planning and planting of herbaceous borders and gives lists of suitable plants.

GENERAL cultivation and management of a herbaceous border are comparatively simple, provided that the border is confined to the growing of herbaceous perennial plants. Most of these plants become dormant during winter, usually dying back in autumn to a perennating root or other part of the plant.

By preparing the area thoroughly and planning it carefully before planting the necessity for lifting, dividing, and replanting should be avoided for 3 or 4 years.

The planning of the herbaceous border requires considerable thought and cannot be done in a few minutes. There are three chief aims in the initial planning: To provide a continuous display of colour for as long a period as possible; to provide interest by form and foliage as well as by blooms; and, at all costs, to avoid bare, uninteresting gaps at any time.

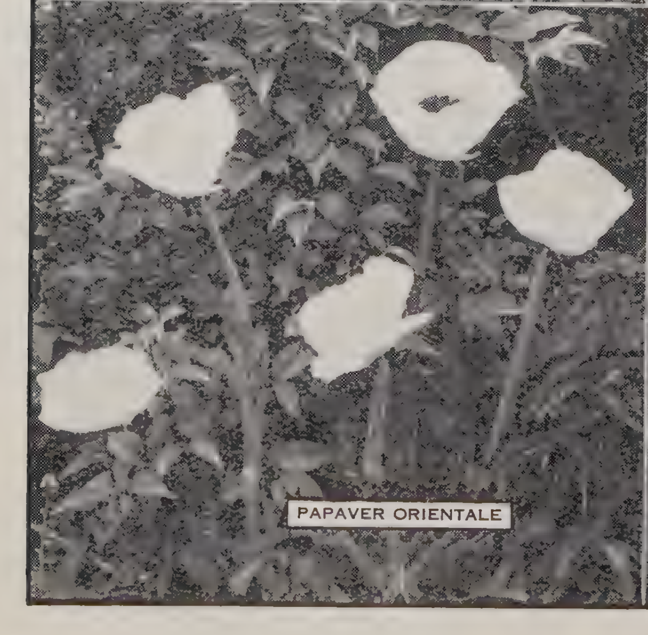
Once the general shape and desired pattern of the border have been decided the border should be divided roughly into front, middle, and back sections. The three divisions must be made to accommodate plants of varying sizes—dwarf, medium, and tall.

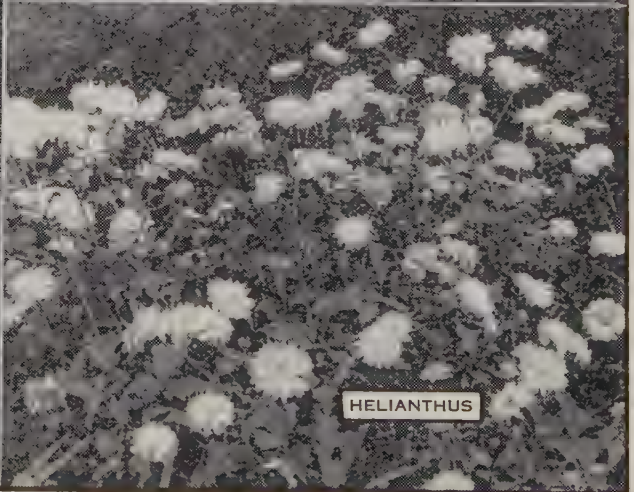
Species for Various Sections

The first aim in planning the front section should be to incorporate a number of plants of tidy appearance with semi-permanent foliage, such as aquilegias, heucheras, and violas. A number of late-summer and autumn-flowering types such as summer chrysanthemums, heleniums, and asters, whose foliage remains neat throughout the growing

RUDBECKIA LACINIATA GOLDEN GLOW

ASTER ALPINUS


PAPAVER ORIENTALE


HELIANTHUS

[*Douglas Elliott photos.*

season, should also be used. Grey foliaged plants are also a very valuable asset in the front section. For best effect all late- and early-flowering species and varieties should be interplanted.

The middle section of the border is most likely to be the focal point, and for this reason chiefly, this section should have the early-flowering plants such as delphiniums, anchusas, oriental poppies, and lupins. By the time these plants have finished flowering the species in front will have grown tall enough to hide any untidiness that remains.

Summer-flowering bulbous plants of a tall-growing type may be used with excellent effect in the middle section to provide the colour display after the early subjects have finished flowering. Gladioli and many lilies are useful here.

Interspersed among the early-flowering types and the bulbous plants in the middle section should be some later-flowering subjects, preferably with neat growth habit, such as phlox, aster, and helenium.

Solidagos, *Chrysanthemum uliginosum*, tall asters, and all other high-growing perennials must be placed in the back section, although occasional clumps of them brought forward into the middle section add much interest.

A few plants with open growth habit, such as *Gypsophila paniculata*, can be grown in the back section to fill spaces between clumps of very erect growth. Everlasting peas or clematis species trained over a fence or old stumps as a backdrop complete the picture.

Staking

Even the best-planned borders can be untidy if plants are allowed to grow without attention. The whole purpose of planning is destroyed if plants are allowed to fall over as they reach maturity and begin to flower. A small amount of time spent in staking is all that is necessary. Staking should not be left until plants fall over; it should be done progressively during the growing season. It is not hard to place stakes so that they are concealed when plants are in flower.

[Photo News Ltd. photo.

Single chrysanthemum Bullion. Chrysanthemums should be disbudded as the flower buds develop.

Flower Garden Work for April

Begonias in pots should be dried off gradually by giving them less and less water until the leaves and stems turn yellow. When the plants are dormant the pots should be put in a dry, frost-proof place. Fibrous-rooted begonias should be lifted from the borders when autumn frosts cause growth to cease for the year, set closely in boxes, and stood in a sheltered, frost-free place for the winter. Plants can be started into growth next spring and new plants propagated from cuttings.

Herbaceous Border Perennials and their Flowering Seasons

Spring

Alyssum saxatile
Arabis
Aubrietia
Doronicum
Iberis
Polyanthus
Saxifraga cordifolia

Late Spring and Early Summer

Aquilegia hybrids
Dielytra
Geum
Honesty (lunaria)
Iris germanica hybrids
Papaver orientale
Saxifraga cordifolia

Summer

Achillea spp.
Aconitum (Spark's variety)
Anchusa italica Dropmore
Anchusa italica Opal
Anemone japonica alba
Anemone japonica
Bocconia cordata
Campanula latifolia
Campanula persicifolia
Carnations
Centranthus spp.
Chrysanthemum maximum
Coreopsis grandiflora
Delphinium
Dianthus (pinks)
Dictamnus caucasicus
Dielytra spectabilis
Echinops ritro
Erigeron speciosus
Funkia sieboldi
Gaillardia grandiflora
Galega
Geranium ibericum
Geranium grandiflora
Geum
Gypsophila "Bristol Fairy"
Gypsophila paniculata
Heliopsis scabra
Hemerocallis aurantiaca
Inula glandulosa
Iris germanica hybrids
Linum perenne
Lupinus polyphyllus
Lychnis spp.
Lythrum salicaria
Monarda didyma
Monarda violacae
Nepeta mussini
Oenothera glauca
Paeonia.
Papaver orientale
Pentstemon spp.
Phlox decussata
Potentilla
Pyrethrum
Scabiosa caucasica
Sidalcea
Statice latifolia
Thalictrum
Tradescantia
Verbascum
Veronica spicata

Late Summer and Early Autumn

Achillea, The Pearl
Aconitum fischeri
Anemone japonica
Aster spp.
Chrysanthemum
Echinacea purpurea
Gladiolus
Helenium
Kniphofia
Montbretia
Rudbeckia
Solidago

Autumn

Achillea, The Pearl
Aconitum fischeri
Aster spp.
Chrysanthemums
Helianthus
Iris foetidissima
Kniphofia
Nepeta mussini
Physalis alkekengi
Rudbeckia
Solidago canadensis
Schizostylis

Winter

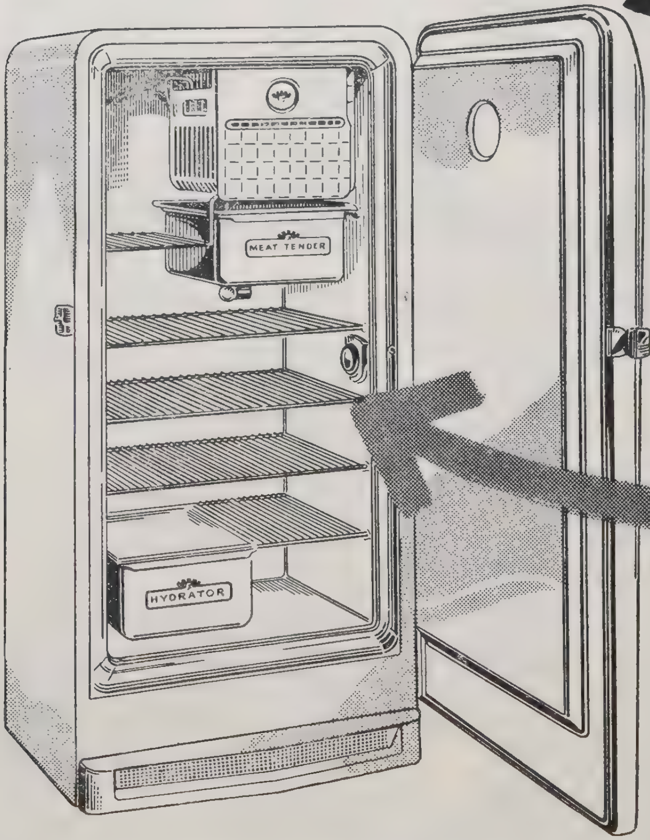
Helleborus niger
Iris stylosa
Kniphofia (tritoma)
Petasites fragrans
Schizostylis coccinea
Sternbergia lutea

Bulbs in bowls potted up and stood out in a cool place to root should be cleaned up and taken into the house as soon as shoots appear above the soil. They should be put in a cool room at first and watered sparingly. If bowls of bulbs are not given this period of rooting at a low temperature, the leaves start to grow before there is an adequate rooting system to support them, and the flowers are not as fine as they should be.

Bulb planting should be concluded in April, except in warm northern districts, where tulips are better kept in a cool place until May before being planted out. There is no point in keeping bulbs out of the ground longer than necessary, as they shrivel and deteriorate, and bulbs not planted at the proper time cannot be held over until the following season like many sorts of seeds.

Chrysanthemums should continue to be disbudded as the flower buds develop. Though stems with a single bloom are usually considered best for cutting, there is no need to take off too many buds from plants grown solely for border display. However, it pays to remove a proportion of buds even from border chrysanthemums, especially the buds growing from the stem below the main flower cluster, and also to remove side shoots growing from lower down the stems. That involves a certain amount of trouble, but much improves the appearance of the plants when in flower. Chrysanthemums not yet fully staked should be supported at once, as the stems rapidly become top heavy when the flower buds swell. In districts liable to heavy frosts the late varieties of chrysanthemums can now be wrenched, lifted, and carefully replanted in a glasshouse or in a sunny, sheltered place where the blooms can be protected from frosts. Plants should not be packed too tightly together, because if this is done, the leaves will be attacked by chrysanthemum

THERE'S MORE USABLE SPACE IN MY 7.4 cu. ft. Frigidaire



More Refrigerated Storage Space — less size! Compare this handsome 7.4 cu. ft. FRIGIDAIRE with all other makes of refrigerator. Check its overall size — then look inside at the usable **refrigerated** storage space it provides.

WORLD-FAMOUS "METER-MISER". Only FRIGIDAIRE has the exclusive sealed unit "Meter-Miser" — simplest cold-making mechanism ever made. Uses less current than an ordinary light bulb and is guaranteed for 5 years.

- **LARGE SUPER FREEZER** — Stores 19.2 lbs. of packaged ice cream and other frozen foods at freezing temperature. Spring-loaded door stays open or shut as required.
- **"QUICKUBE" ICE TRAYS** — The famous FRIGIDAIRE "Quickube" Ice Trays come out easily no matter how hard they are frozen. Ice-cubes pop up at the pull of a lever — two at a time or a tray-full!
- **ADJUSTABLE COLD CONTROL** — Twelve different settings are available, including "off" and "Defrosting". Special setting for holiday periods.
- **AUTOMATIC INTERIOR LIGHT.**

DISTRIBUTED BY

FRIGIDAIRE

DIVISION OF GENERAL MOTORS NEW ZEALAND LIMITED

THROUGH A NEW ZEALAND-WIDE NETWORK
OF AUTHORISED FRIGIDAIRE DEALERS

4893/24

mildew. Chrysanthemums growing in pots should be fed regularly with liquid manure.

Dahlia roots are tender and are killed by hard frost. In districts where the ground is likely to freeze hard in winter dahlias should be cut down to about 6in. above the ground before the first hard frost is likely and after the plants have finished flowering. Labels should then be tied to the bases of the stems to identify the varieties and the tubers lifted carefully with a spade and set aside in an airy, frost-free place to dry. When dry the roots should be stored for the winter in a cool shed where they will be safe from frost. In most districts in New Zealand the roots can be left safely in the ground for the winter, but lifting and storing them leaves the ground clear for digging over in winter and eliminates the risk of losing the roots in winters which are exceptionally severe for the district.

Fuchsias growing in pots are usually dried off in April, though the soil in the pots should not be allowed to become completely dry. If desired, pot fuchsias can be kept growing throughout winter on a sunny windowsill, and often will bear flower buds, though these usually fall off before they open. The plants should be kept drier than during summer and autumn and pruned back hard in spring to start them into growth again and prevent them from becoming too large for use in the house.

Gladioli should continue to be lifted and dried off when the leaves show an obvious change of colour; plants lifted earlier and now dried off can be prepared for storage by cutting off the leaves an inch or so above the corms and rubbing off the old, shrivelled corms. The skins should not be removed until spring, as corms keep better in store with their skins in place. Seedlings sown last month should be kept growing strongly until they each have two leaves, after which they should be watered less and less and gradually dried off.

Herbaceous perennials which have finished flowering should be cut down to within a few inches of the ground, the stubs being left to mark the positions of the roots. Plants which have been in for several years and need dividing can be lifted now, the ground dug over, and well-rooted pieces of the plants replanted. Gaps in the border can also be planted up now, making proper use of the perennial scabious, pyrethrums, delphiniums, aquilegias, and perennial phlox, all of which are worth a place in every mixed border and do not spread unduly.

Cuttings from the frame should be planted out as they root and Iceland poppies and other seedlings planted from the boxes in which they have been grown. Sturdy antirrhinum seedlings found growing in the borders can be transplanted to fill up gaps and all pansy, viola, Canterbury bell, gaillardia, and hollyhock plants still growing in frames or nursery beds should be planted into the borders where they are to flower next year.

Pot plants growing in the house should be washed by being held upside down under a cold tap. This washes off pests such as red spider, thrips, and aphis and freshens up the plants. Leaves which show small, whitish dots on their upper surfaces or become rust coloured indicate that red spiders are feeding on the under sides. Red spiders can be seen with the naked eye, often moving beneath a thin webbing. Pot plants still growing strongly should be fed regularly with liquid manure or complete fertiliser of a suitable grade. Geraniums and balsams which have grown too big to be accommodated on windowsills should be pruned hard, the old, leggy growths being removed; new shoots will soon grow from the bases of the plants. If plants are grown in a window where blinds are drawn at night, it is worth while to have the window ledge widened by the addition of a strip of wood so that the pot plants can stand well away from the window and the drawn blinds do not touch the pots. If blinds or fringes come into contact with the pots, they absorb moisture that may stain the fabric and such stains are hard to remove.

[*Sparrow Industrial Pictures Ltd. photo.*

Gardeners should continue to lift and dry off gladioli as soon as the leaves show an obvious change of colour.

Shrubs which are to be moved and were partly wrenched last month should now be prepared further; the rest of the shrub should be dug round and the remaining roots severed some distance from the trunk. The shrubs, which should not be moved for 6 to 8 weeks after being wrenched, will now have little anchorage and should be supported with strong stakes to prevent them from being blown over.

Stakes can be preserved by dipping them in a proprietary wood preservative. Another very satisfactory way of lengthening the life of manuka stakes is to dip them in creosote and then plunge the butts into hot tar for the depth to which they will be embedded in the ground. Stakes treated this way last for up to 8 years if well stacked off the ground when not in use.

Thinning annuals sown earlier should be continued and annuals and bedding plants which have finished flowering should be pulled out.

Faded and dead flower heads should be taken off regularly week by week.

Hydrangeas should be pruned, if that has not been done in relatively mild districts.

Plants to Propagate this Month

Buds inserted earlier should now be established. Ties should be cut before the swelling stems cause them to bite into the bark.

Cuttings of many perennial plants such as geraniums, hybrid wallflowers, catmint, and marguerites will still root if put in cold frames. Viola cuttings may also be taken, using only young, strong shoots. This is the season to start taking hard-wood cuttings of shrubs; they should be 6 to 10in. long, and with evergreens the lower leaves should be removed. Among the many shrubs easy to propagate in this way are *Lonicera nitida*, escallonia, privet, and flowering currant. (A hard-wood cutting is one in which the whole stem is woody to the tip.) The cuttings should be inserted firmly in the soil with about half their lengths buried.

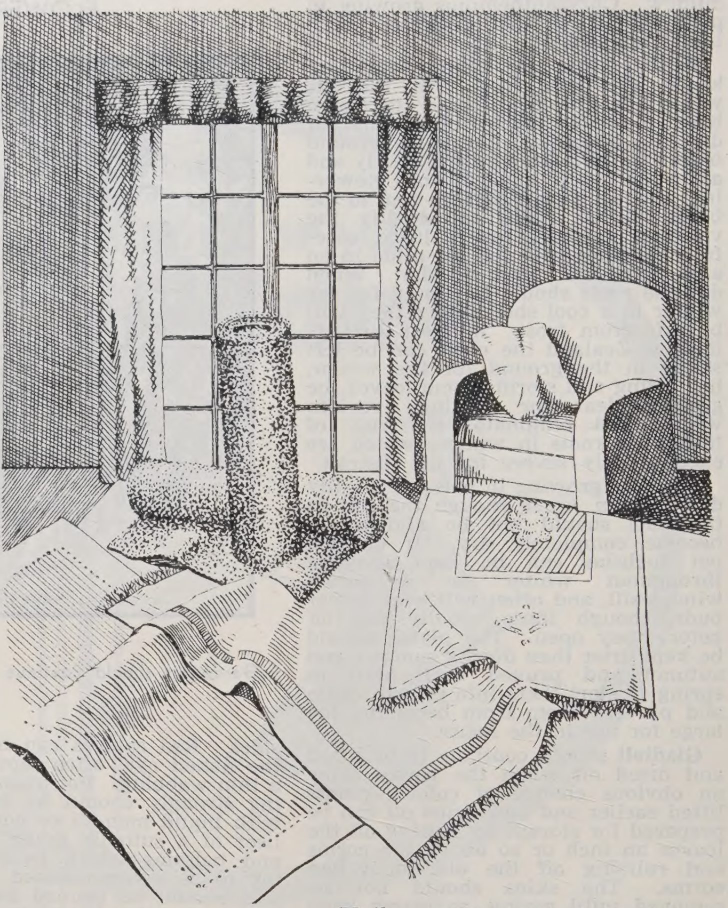
Lift, divide, and replant pinks, double daisies, and herbaceous perennials which have finished flowering.

Plant out cinerarias (in a semi-shady place), Iceland poppies, forget-me-nots, wallflowers, and other bedding plants that will make a showy display in spring. Planting should be done as soon as summer bedding plants and annuals have been removed to give the new plants the benefit of the warmth which is still in the soil. If planting is delayed unnecessarily, the plants have less chance of becoming well established before cold weather sets in.

Sow a further batch of annuals for early flowering in the warm, northern districts, where most of the hardy annuals will grow steadily all through winter.

WOOL
Has many Uses in the Home

WOOL is a constant friend in the home, covering floors, windows, and chairs and providing almost every kind of furnishing accessory from cushion covers to coloured table mats, curtain fringes, and cords. It brings warmth and comfort and has a distinctive, well-cared-for look about it that no other material can quite achieve. Such is its versatility that it is appropriate for any furnishing scheme, period or modern. Thick pile carpets, felts and heavy twills, fine nets, smooth-surfaced worsteds, or rough-faced novelty tweeds—wool contrives them all with unequalled richness of colour and variety of pattern.

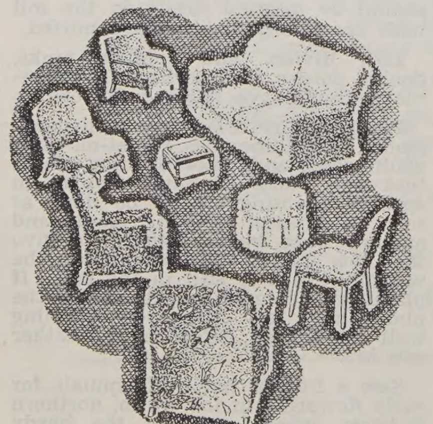


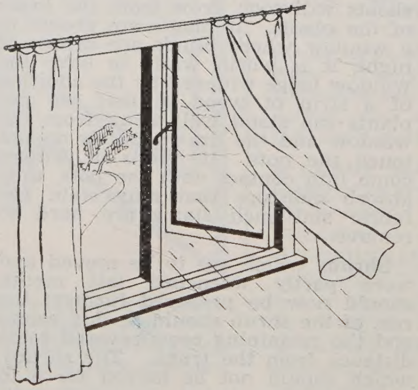
Moths can be perfect pests in carpets, curtains, and upholstery, but soon furnishing fabrics will be made from wool so treated that moths will go out of their way to avoid it.

AS early as the 14th century carpets were made by hand in Spain entirely of wool, and the craft probably reached its peak in the 16th century among the Turks and Persians, to whom the carpet seems to have been the most important item in the home, being used for sitting on, sleeping on, and even as a table for meals. Wool has the strength and resilience essential to the surface of a carpet. Light-coloured rugs, once considered impracticable, can now be made of woven wool which can be washed easily and often.

Felts

Flooring felt used to be merely the rather dreary material that went under carpets and never saw the light of day, but modern felts are floor coverings in their own right. They have a smooth, hard-wearing surface that does not soil easily and cannot wear threadbare, as the colour and texture are constant through the thickness of the material. They are made in colours to blend with every conceivable furnishing scheme.





Curtains

Whether curtains are required mainly for decoration or for keeping out cold, wool is adaptable and can provide homely tweeds, printed felts, sheer wool nets, and fine printed worsteds to produce almost any effect desired. Wool curtains drape well, resist creases, and keep their shape and "hang" even if soaked by rain through an open window. There is no risk of their flaring up should a spark shoot from the fire, and with new methods of shrink control the latest wool fabrics can be washed without a qualm.

Upholstery

Wool upholstery for chairs is soft, springy, and warm and prevents shine on clothes. Wide scope is offered to designers. There are coloured felts which combine well with polished wood to give clean, modern lines; hard-wearing tweeds for family armchairs; heavy twills, cords, and reps for all purposes, and fine, printed, washable wools for loose covers. A neat finishing touch is given by contrasting edgings and pipings in coloured wool that also protect corners from excessive wear.

One of the latest upholstery developments, sure to be welcome in the kitchen and nursery, is plastic-covered wool in bright colours which does not chip or crack and can be sponged to remove marks.

Science is continually experimenting with this adaptable fibre to meet new needs, and a vision of a house from which everything of wool had been removed—every curtain, every carpet, every chair cover, every mat and rug, down to the smallest cord and tassel—brings home the realisation that wool is indispensable in the home.

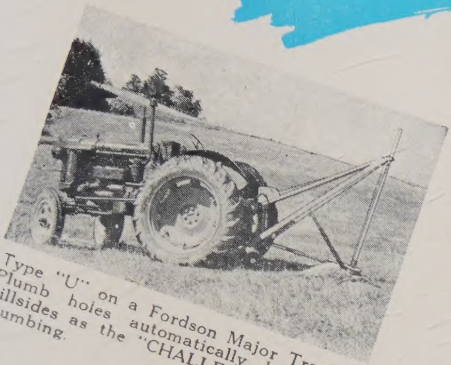
◆

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—32577

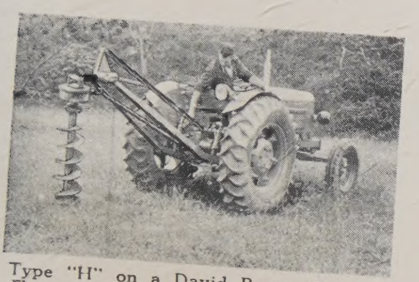
CHALLENGE

POST-HOLE BORERS

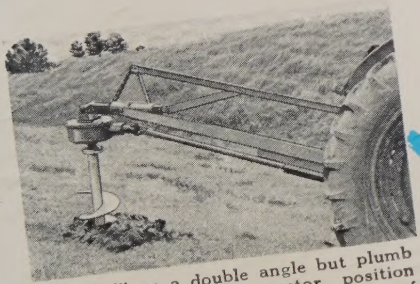
TYPE "H"—HYDRAULIC
TYPE "U"—UNIVERSAL



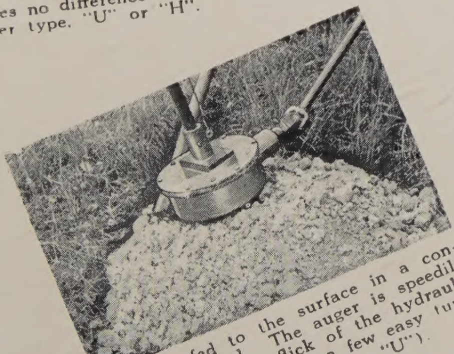
Type "U" on a Fordson Major Tractor. Plumb holes automatically bored on hillsides as the "CHALLENGE" is self-plumbing.



Type "H" on a David Brown Tractor. The operator is engaging the P.T.O. to commence boring.



Type "H" on a double angle but plumb hole assured. The tractor position makes no difference to the operation of either type, "U" or "H".



Spoil is fed to the surface in a convenient mound. The auger is speedily withdrawn by a flick of the hydraulic lever (Type "H") or a few easy turns of the winch handle (Type "U").

Check THESE OUTSTANDING FEATURES

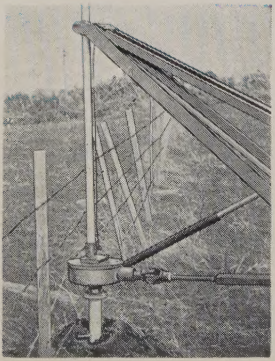
- Fits any make of tractor.
- Only one operator required.
- Can be attached in three minutes.
- Plumb holes assured.
- Extreme flexibility allows hole to be bored at the required angle regardless of the tractor's position.

Send for FREE illustrated pamphlet which explains these advantages in detail.

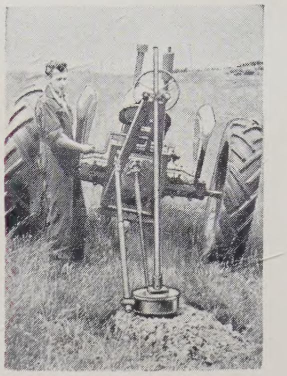
ESTABLISHED 1861
CHALLENGE

Wright, Stephenson & Co. Limited.

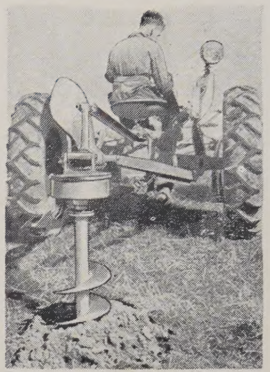
Master New Zealand Distributors
ALL BRANCHES



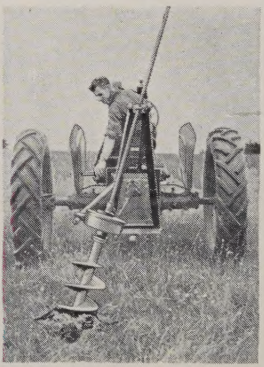
Type "U" boring a hole in an existing fence line without removing or slackening any wires. Type "H" will do the same.



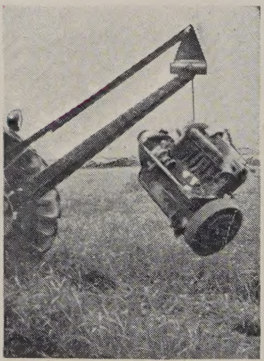
Type "U" on a Massey-Harris Tractor. Note how the operator is controlling the boring with his hand on the winch.



Type "H" on a Ferguson Tractor. Note that operator remains on the tractor seat and holds the hydraulic control lever.

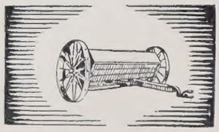


Type "U" on a Massey-Harris Tractor putting down an angle-hole. Illustrating the flexibility of the "CHALLENGE".

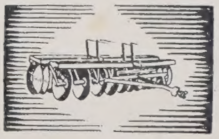


Both types "H" and "U" lift and transport heavy objects, pull fence posts, etc.

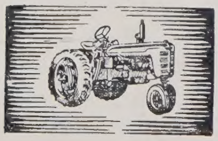
an
international
source of
supply



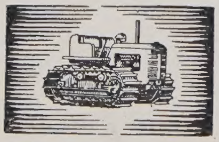
FROM SWEDEN
Fertilizer Distributors



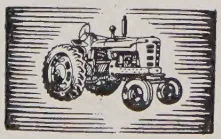
FROM AUSTRALIA
Mowers, Tractors, Disc Harrows, Potato Planters, Motor Trucks



FROM FRANCE
Wheel Tractors, Field Cultivators

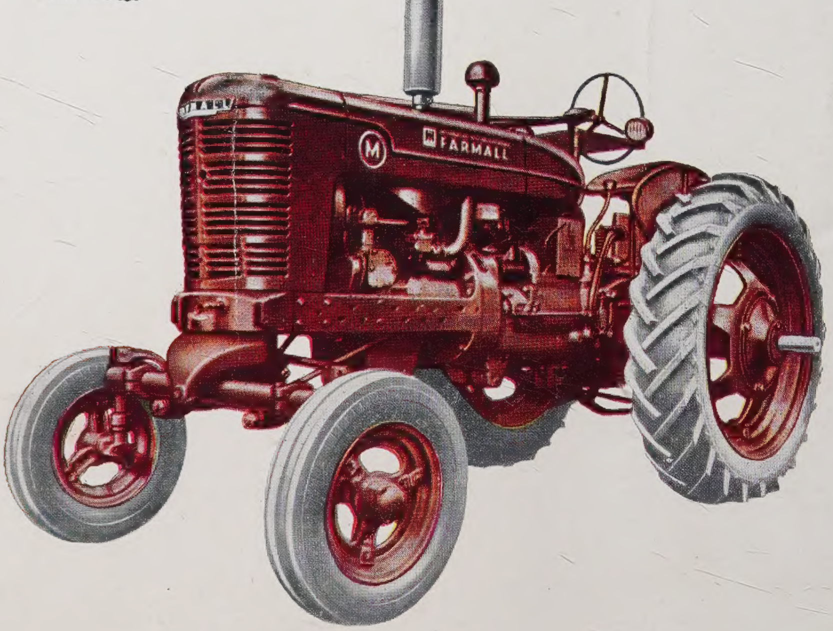


FROM U.S.A.
Crawler Tractors, Cub Tractors, Harvester Threshers, Hay Balers, Hay Choppers



FROM ENGLAND
Hay Balers, Tractors, Green Crop Loaders

. . . FROM ENGLAND



The powerful McCORMICK INTERNATIONAL

FARMALL M

THE International Harvester factory at Doncaster, England is now in full production of the famous McCormick International FARMALL M tractors. The FARMALL M is a powerful tractor ideally suited to N.Z. conditions . . . the famous time-tested 4 cylinder engine (with specially hardened crankshaft and replaceable precision bearings) gives extra power (30.62 h.p. at drawbar, 34.82 h.p. at belt) to handle big implements under all soil conditions . . . 5 forward speeds ranging from 2.6 to 16.2 m.p.h. give adaptability to all types of field and road work . . . both front and rear wheels are adjustable for cropping. The Farmall M is completely equipped (including heat indicator and radiator shutter control) and is precision built to stand up to years of the toughest going on big acreages. Associated direct-connected and pulled-behind implements are obtainable and maximum use can be made of existing equipment.

FARMALL—Leader since 1923

Mail this coupon below for full information and specifications

INTERNATIONAL HARVESTER CO. of N.Z LTD.,
P.O Box 563, Christchurch.
Please send me descriptive literature of the FARMALL M

NAME ....
ADDRESS ....

INTERNATIONAL HARVESTER
INTERNATIONAL HARVESTER CO. OF NEW ZEALAND LTD.
HEAD OFFICE: P.O. BOX 563, CHRISTCHURCH.
Branches at: **Auckland, Palmerston North, Wellington and Dunedin.**

INTERNATIONAL HARVESTER